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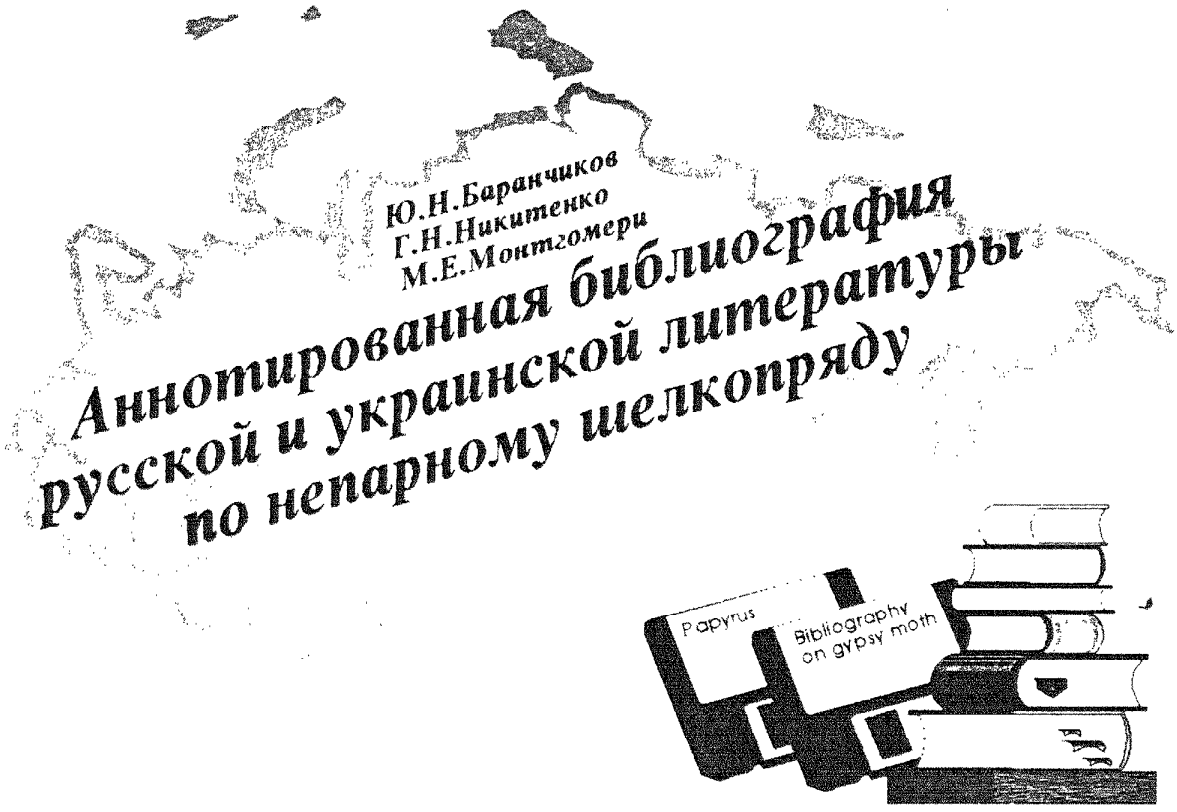
Russian and Ukrainian Literature on the Gypsy Moth: An Annotated Bibliography

Yuri N. Baranchikov
Galina N. Nikitenko
Michael E. Montgomery



Abstract

This bibliography contains 1185 references to literature on the gypsy moth published from 1837 to 1991 in the territory occupied by the former U.S.S.R.. The bibliography is designed to assist researchers within and outside the former U.S.S.R. to identify, locate, and correctly cite the original Russian or Ukrainian references in English. The bibliography contains publications on gypsy moth ecology, physiology, biochemistry, distribution, behavior, and control. The bibliography also presents indices of key words and natural enemies are cross-referenced to the citations. Introductory remarks give information on locating gypsy moth and other literature in libraries of the former U.S.S.R., bibliographic styles used in the U.S.S.R., transliteration of the Cyrillic alphabet to the Latin alphabet, and a listing of Soviet and pre-Soviet journals with papers on forest entomology and forest protection.

The Authors

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CONTENTS

Introduction

The gypsy moth, *Lymantria dispar* (L.) (Lepidoptera: Lymantriidae), is found throughout much of the territory of the former Union of Soviet Socialist Republics (U.S.S.R.). This territory extends from the Baltic Sea and the Carpathian Mountains in Europe to the Pacific Ocean in the Far East of Asia.

The gypsy moth also is an important pest in western and central Europe and in North America. Female moths in these populations lack flight, whereas in the former U.S.S.R. the females are capable of flight. Other differences include feeding behavior and morphology between "western" and "eastern" populations of gypsy moth (Montgomery and Wallner 1988).

The accidental introduction of gypsy moth from the Far East of Russia to the West Coast of North America in 1991 provided an impetus for researchers in Russia and the United States to share information on the gypsy moth.

This is the first detailed compilation of the Russian and Ukrainian literature on the gypsy moth. Previous bibliographies published in the West included only a small portion of the literature published in the U.S.S.R. and many references contain errors that make it impossible to identify and locate the original source.

Sources of Information

Library Holdings and Catalogues

All published material in the former U.S.S.R. was deposited in central libraries and cataloged. Most of the references cited here can be found in the Central Agricultural Library located in Moscow and the library of the Sukachev Institute of Forest, Krasnoyarsk, Russia. To facilitate location and retrieval of the publication, we have provided the full, unabbreviated source name that a librarian in the central libraries would need.

Bibliographic cards in the librarian's catalogue (Fig. 1) give full bibliographical descriptions.

Card fields

1	**Иванов А.М.**
2	Рост гусениц непарного шелкопряда при питании хвоей лиственницы
3	// Экология. - 1989. - № 6. - С. 59-65.
4	Рез. англ.
5	Табл. 2. Ил. 2. Библиогр.: 12 назв.
6	- - 1. Шелкопряд непарный - Питание.
7	УДК 595.78:591.532
8	№ 313392
9	15 № 1784

Figure 1.-- Example of a Russian library card for an article in a journal. Card fields: 1 - author last name and initials; 2 - title of the article; 3 - journal title, year, issue number, pages; 4 - language of the article's abstract; 5 - number of tables, figures, and references; 6 - key words; 7 - subject classification number; 8-9 - library's number.

Bibliographic Descriptions

State standards for bibliographic descriptions in the former Soviet Union, (e.g., GOST 7.1-84; GOST SEV 2012-79 and others) remain in effect in Russia.

Many Ukrainian and Russian language journals did not have a volume number, only the number of the issue for that year. Pagination of journals often was issue-based. Bibliographic citations published before 1960 often omitted the number of pages of the article, chapter, or book. The titles of periodicals and books are lower case except for the first word and proper nouns. For those journals without volume numbers, we have given the issue number in parentheses and do not give a mock volume number. Some "Western" bibliographies will give the year of publication as the volume number.

Most of articles cited in this bibliography were published by academic institutes as collections. Generally, these collections were published as volumes of an institute's yearly proceedings. These articles have complex, three-level, bibliographical citations that treat the paper as a chapter in a book with a unique collection name, which is followed by the name of the series of the proceedings of the institute. Publication frequency could be several times a year, yearly, or irregularly. These are commonly titled "proceedings of..." or "scientific proceedings" (the latter is "nauchnyye trudy" in Russian and "naukovi protsi" in Ukrainian). There are also collections (sborvik), news (izvestiya), transactions (zapiski), annals (izvestiya), and other terms that refer to the published collections of reports. Abstracts (tezisy) are often published by conferences.

An institute may divide its output into separate series based on a general subject matter such as zoology. Each series may have an issue on a specific topic such as entomology; these are part of the numbered volume that represents all of the institute's output for a specific period. The results of this are complex, multi-level bibliographical citations. Often, one or two parts of these complex bibliographical descriptions are omitted when Russian authors list references in their publications. Libraries file these publications variously by the issue title, proceeding title, or the title of the institute and, thus, can be difficult to locate without the full title.

The editor of a proceedings or collections usually is not included in a Russian citation or listed in catalogue files. If editors are given in a proceedings, they often are the administrative officials of the institute. The publisher of a proceedings is often not listed in Russian citations. The publisher often is the institute and can be inferred from the title of the proceedings.

In this bibliography, information was not included on the editor and publisher of proceedings or other collections by institutes. If an editor is given, it usually is the responsible official of the institute rather than the subject editor.

Resources Consulted

The bibliography was compiled from the authors' personal collections and three major resources:

1. Referativnyy Zhurnal, Tom Biologiya - [The Journal of References, Vol. Biology] - This is a collection of annotated references of current world literature published monthly, beginning in 1961, by the All Union (now Russian) Institute of Scientific Information (VINITI) in Lubertsy, near Moscow.

2. Catalogs and stacks of books of the main libraries

- In Russia:

- Central Agricultural Library, 3 Orlikov Pereulok, Moscow, 107804 Russia;
- Central Scientific Library of Russia (former Lenins's Library), 3 Novy Arbat, Moscow, 121019 Russia
- Library of Zoological Institute of Russian Academy of Sciences, 1 Universitetskaya Nabereznaya, Saint Petersburg, 199034 Russia
- Library of the Zoological Museum of Moscow State University, 6 Ul. Gertsena, Moscow, 103109 Russia
- State Public Scientific and Tecnical Library of Siberian Branch, Russian Academy of Sciences, 15 Ul. Voskhod, Novosibirsk, 630200 Russia
- Library of V.N.Sukachev Institute of Forest, Siberian Branch, Russian Academy of Science, Akademgorodok, Krasnoyarsk, 660036 Russia

- In Ukraine:

- Library of I.I. Shmalgausen Institute of Zoology, Ukrainian Academy of Science, 15 Bogdan Kchmelnitskiy Str., Kiev-30, 252000, Ukraine
- S.I.Vernadskiy Central Scientific Library, Ukrainian Academy of Sciences, 49, 40 Let Octabrya Prospect, Kiev-39, 252650, Ukraine
- Ukrainian Central Public Library, 1 Grushevskiy Str., Kiev-1, 252000, Ukraine
- Ukrainian Central Agricultural Library, Goloseevo, Kiev, 252000, Ukraine
- Library of Ukrainian Institute of Plant Protection, 33 Vasilkovskaya Str., Kiev-127, 252000, Ukraine
- Library of Kiev State University, 58 Vladimirakaya Str., Kiev, 252000, Ukraine

- In Moldovia:

- Central Scientific Library of Moldovian Academy of Sciences, 1 Lenin Prospect, Kishinev, 277612, Moldovia

3. Personal libraries of V.I. Benkevich, V.A. Kolibin, A.F. Krishtal, A.G. Kotenko, V.M. Yanovskiy, V.P. Pospelov, E.A. Zverozomb-Zubovskiy

We also checked for Russian literature in the bibliographies by Campbell et al. (1978), Griffiths (1980), and Schaefer et al. (1988) and found three citations that were new to our list. We also searched the electronic data

bases (AGRICOLA, BIOSIS, CAB, AGRIS, CA search) for literature on *Lymantria* (*Porthetria*) (*Ocneria*) (Liparis) *dispar* published between 1978 and 1987 and found a total of 118 citations from the U.S.S.R., of which 13 were new to this data base.

Nearly 70 percent of the cited publications were examined in the original. Those not examined in the original were published mainly before World War II and were obtained from reference journals, reviews, and other sources.

Several of the journals cited in the bibliography are important sources of information on entomology in the former U.S.S.R. Appendix 1 lists the Russian transliteration of the title, the English translation of the title, and the number of articles on the gypsy moth we found in the journals.

Preparation of the Bibliography

Transliteration

Names of the authors and the sources (book, journal, etc.) in the bibliography are transliterations of Cyrillic characters to Latin characters. There are many systems to transliterate or romanize Russian and other Slavic languages. Since transliteration depicts the sound of a Russian word using the Latin alphabet, spellings are different for English, French, or German systems. Thus, there can be several different transliterated spellings of the same Russian word. To provide consistency, we used the system of the United States Board on Geographic Names (BGN System) (Table 1). This system is preferred by "The Chicago Manual of Style" (University of Chicago Press 1993) and the "United States Government Printing Office Style Manual" (U.S. Government Printing Office 1984). Transliterations of word endings are given in Table 2.

Table 1.—Russian alphabet and BGN transliteration

Cyrillic	Latin	Cyrillic	Latin	Cyrillic	Latin
Аа	a	Кк	k	Хх	kh
Бб	b	Лл	l	Цц	ts
Вв	v	Мм	m	Чч	ch
Гг	g	Нн	n	Шш	sh
Дд	d	Оо	o	Щщ	shch
Ее	ye[1], e	Пп	p	Ъъ	" [3]
Ёё	yë[2], ë	Рр	r	Ыы	y
Жж	zh	Сс	s	Ьь	' [4]
Зз	z	Тт	t	Ээ	e
Ии	i	Уу	u	Юю	yu
Йй	y	Фф	f	Яя	ya

[1] *Ye* initially, after vowels, and after ъ, ь.
[2] *Yë* as for *ye*. The sign Ё is not considered a separate letter of the alphabet, and the "¨" is often omitted.
[3] " double apostrophe.
[4] ' apostrophe.

Table 2.—Endings of Russian words and their transliteration

Cyrillic ending	Transliteration	Cyrillic ending	Transliteration	Cyrillic ending	Transliteration
ай	ay	юй	yuy	ные	nyye
ей	ey, yey	яй	yay	ние	niye
ий	iy	ще	shche	кий	kiy
ой	oy	щий	shchiy	кая	kaya
уй	uy	же	zhe	щийся	shchiysya
ый	yy	жать	zhat'	щаяся	shchayasya
эй	ey	ся	sya	ное	noye

The "linguistic" system uses j, ju, and ja for y, yu, and ya of the BGN system. For example, the Yankovich cited herein could be the same Jankovich referred to in other citations. The BGN system gives Chaykovskiy for the composer Tchaikovsky, and Moskva for the city Moscow. The familiar spelling, rather than the BGN spelling, usually is preferred for names that are well known to English speakers.

Classification of Reference Type

It was necessary to classify each reference into categories recognized by the bibliographic software we used. The references were placed in four main categories: (1) Journal article, (2) Book, (3) Chapter in a book, and (4) Thesis (see Table 3).

It was very difficult to determine if a reference belonged to a unique collection, a series, or a journal. We considered the publication to be a journal if it had the word "journal" in its title or subtitle or was published under the same title more than once per year. Publications in journals represented less than one-third of the references in this bibliography.

A "book" is a bound volume cited in its entirety. It may be a monograph by one author or a collection of papers where the authors of the book are editors and the book is cited as a whole. For each book reference, the English translation of the title is given in bold face followed by the transliteration of the original title in parentheses. Less than 5 percent of the references were books and many are general discussions of local pests.

The "book" category includes "Deposited Documents", a popular, paper-saving mode of scientific publication in the former U.S.S.R. that is still in use. These pamphlets present research findings too lengthy to be published in U.S.S.R. journals. They are assigned a number by the depository. There are only a few official places for deposition. The main one is VINITI in Moscow, which publishes a monthly catalog of deposited documents. Copies of the Deposited Documents can be obtained from VINITI for a fee.

The "chapter" category includes publications from collections of papers, institutes' proceedings, and proceedings of conferences. A popular form of publication was collections of abstracts. Many of the abstracts have promising titles, but provide little information. Some abstracts, though, provide details that may be useful to others and we have provided lengthy translations of these.

The "thesis" category includes résumés of scientific degree dissertations that are published in a standard booklet of 24 pages. These can be retrieved from libraries by asking for "Avtoreferat dissertatsii ..." and the author and year. The dissertation itself is lengthy and is held in the former Lenin's library and VINITI, both in Moscow. A photocopy can be obtained from the latter for a fee.

Table 3.—Types of publications and citations formats

Type of publication	Example of Russian citation	English translation	Citation in this bibliography
Journal article	Иванов А.А. Непарный шелкопряд // Зоолог.журн. 1989. - Т. 56. - Вып 5. - С. 90-95.	Ivanov A.A. The gypsy moth // Zoological Journal. 1989. - V. 56. - Issue 5. - P. 90-95.	Ivanov, A.A. 1989. **The gypsy moth.** Zoologicheskiy zhurnal. 56(5):90-95.
Book	Иванов А.А. Непарный шелкопряд. Новосибирск: Наука, 1989. - 125 с.	Ivanov, A.A. The gypsy moth. Novosibirsk: Science Publ., 1989. - 125 p.	Ivanov, A.A. 1989. **The gypsy moth.** (Neparnyy shelkopryad.) Nauka, Novosibirsk. 125 p.
Thesis resume	Иванов А.А. Непарный шелкопряд. Автореферат диссертации ... кандидата биологических наук. Красноярск: Ин-т леса СО АН СССР, 1989. - 24 с.	Ivanov, A.A. The gypsy moth. Thesis of dissertation... of the kandidate of biological sciences. Krasnoyarsk: Institute of Forest SB USSR AS., 1989. - 24 p.	Ivanov, A.A. 1989. **The gypsy moth.** Avtoreferat dissertatsii kandidata biologicheskih nauk. Institute of Forest, Siberian Branch, USSR Acad. Science, Krasnoyarsk. 24 p.
Report in a series of an institute	Иванов А.А. Непарный шелкопряд // Тр. по зоологии [Вып.] 12, Энтомология. 1989. - С. 3-45. (Учен. зап. Тарт. гос. ун-та; Вып. 306).	Ivanov, A.A. The gypsy moth // Proceedings of zoology [Issue] 12, Entomology. 1989. P. 3-45. (Scientific Transactions of Tartu State University; Issue 306).	Ivanov, A.A. 1989. **The gypsy moth.** In: Uchenyey zapiski Tartuskogo universiteta, vyp. 306. Trudy po zoologii, vyp. 12. Entomologiya. Tartu: 3-45.
Article in a book	Иванов А.А. Непарный шелкопряд // Экология волнянок. Новосибирск: Наука, 1989. - С. 94-105.	Ivanov, A.A. The gypsy moth // Ecology of tussock moths. Novosibirsk: Science Publ., 1989. - P. 94-105.	Ivanov, A.A. 1989. **The gypsy moth.** In: Ekologiya volnyanok. Nauka, Novosibirsk: 94-105.

Geographic Location of References

Because the territory of the former U.S.S.R. is so vast and has populations of gypsy moth that may differ in behavioral and morphological features, we divided the territory into regions (Fig. 2) and keyed each reference to its region. The first keyword for each reference refers to the regions shown in bold on the map.

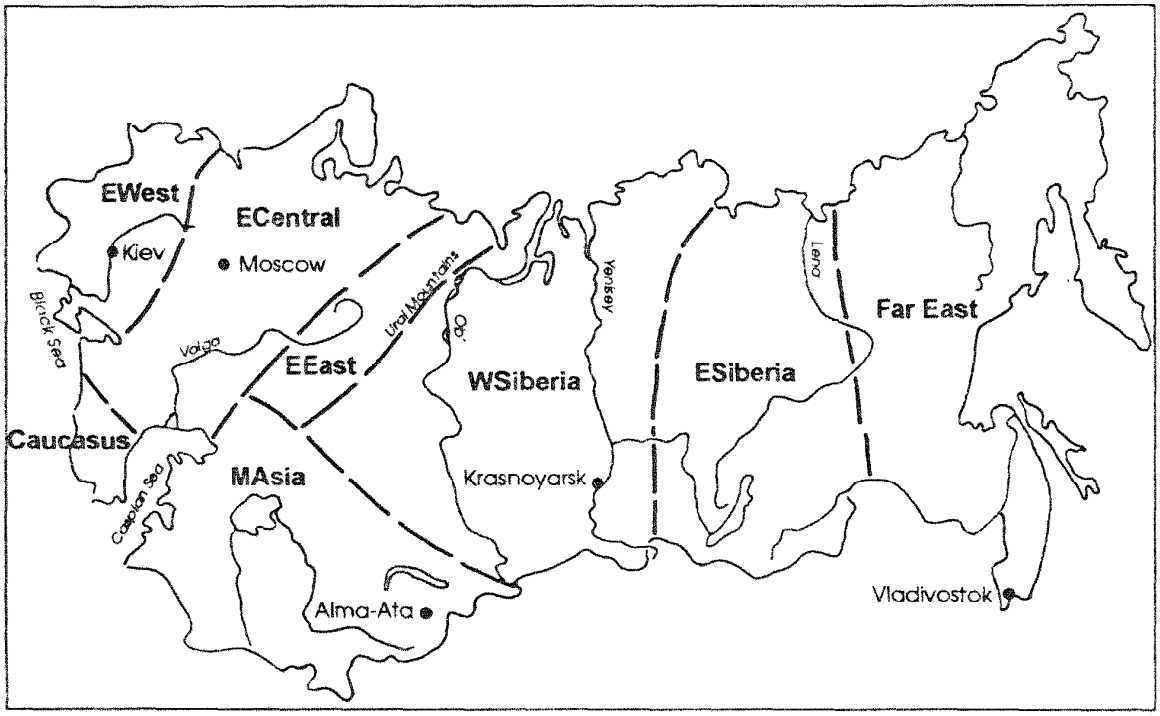

Figure 2.--Geographical regions in the former Soviet Union of the bibliographic entries: **EWest** = west European, includes the former republics of Ukraine, Moldova, Belarus, Latvia, Lithuania, and Estonia; **ECentral** = central European, includes Moscow, Leningrad and the west European part of the Russian Federation; **EEast** = east European, includes the Ural Mountains, east European part of the Russian Federation, Republics of Bashkirtostan and Tatarstan and the Sverdlovsk, Perm' and Orenburg Oblasts; **Caucasus** = includes the former republics of Georgia, Azerbaijan and Armenia, and the northern Caucasus part of the Russian Federation; **MAsia** = Middle Asia: includes the former republics of Kazakhstan, Tajikistan, Uzbekistan, Turkmenistan, and Kyrgystan; **WSiberia** = West Siberia, from the Ural Mountains to the eastern border of Krasnoyarsk Kray; **ESiberia** = East Siberia, from the eastern border of Krasnoyarsk Kray to the Lena and Aldan Rivers; **Far East** = eastern parts of Yakutskaya Republic, Chita Oblast, Khabarovsk and Primorsky Krays, Amurskaya and Magadanskaya Oblasts.

List and Index of Natural Enemies

Appendix 2 lists the scientific nomenclature of the parasites and predators listed in the abstracts. This list is organized into taxonomic groups and includes synonyms or alternate names used in the abstracts as well as the preferred nomenclature. The Arthropod Name Index (ANI) on CD-ROM (CAB International 1996) was used to determine the preferred name for most species. For the Diptera, the nomenclature of Kolomiets and Artamonov (1994) was followed. These authors place species in the genera *Belliericomonaea, Kramerea, Parasarcophaga*, and *Robineauella*, whereas the ANI-CD uses the genus *Sarcophaga*.

To produce an index of the natural enemies, a separate field for the preferred taxon was created in the electronic database. This was used to produce an index sorted by the specific name (Appendix 3). Names in the abstracts are as they appeared in the original article, except for correction of obvious misspellings or typographical errors.

Altogether, there are 167 references that mention parasites and 97 of these give scientific names in the abstract. Review articles with long lists of natural enemies were not included in the index because the species usually were listed in the primary reference. Articles cited in the bibliography with good summaries of natural enemy species include Il'inskiy (1959) and Khitsova and Isaeva (1986) for European U.S.S.R., Zerova et al (1989) for species in the southwestern part of the U.S.S.R., and Kolomiets (1987) for species in the Asian part of the U.S.S.R., and Zimin and Kolomiets (1984) for Diptera.

Keywords

Keywords (Appendix 4) were used to identify the most important subject areas of a reference. They were chosen from a list of 97 general terms.

More than one-fourth of the references mention control of the gypsy moth. Many of these are general with little specific information while others refer to a type of control such as using virus as a pesticide. Control was used as a keyword if the article discussed control in general or several types of control. If a specific control method and details were provided, more specific keywords were used; e.g., microbial pesticide, bacteria. By far, the most prevalent control method was destruction of egg masses by physical removal or direct treatment with petroleum or insecticides.

Many articles were lists of several pests of several pests or insects that included the gypsy moth. These are designated as pest lists or faunal lists. Many of these contain little research information about gypsy moth, but document its pest status and distribution.

More than 10 percent of the references give host plant information. Only the common name of host plants was available usually because the Latin binomial was not provided in the original or abstract. Although common names of host plants were not listed as keywords for each abstract, we generated an index to host plant names as a subcategory under host plants in the keyword index.

Literature Cited

CAB International. 1996. **Arthropod name index on CD-ROM.** Wallingford, UK: CAB International.

Campbell, R.W.; Levitan, L.C.; Sobecki, E.R.; Tardiff, M.F., 1978. **Population dynamics of the gypsy moth: an annotated bibliography.** Gen. Tech. Rep. NE-48. Broomall, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station. 124 p.

Griffiths, K.J. 1980. **A bibliography of gypsy moth literature. Vol. 1 and 2.** Report O-X-312. Sault Ste. Marie, ON: Canadian Forestry Service, Great Lakes Forest Res. Centre. 350 p.

Kolomiets, N.G.; Artamonov, S.D. 1994. **Diptera as entomphags of forest silkworm moth (in Russian).** Nauka, Novosibirsk. 151 p.

Montogmery, Michael E.; Wallner, W.E. 1988. **The gypsy moth: a westward migrant.** *In* Berryman, A.A., ed. Dynamics of forest insect populations. New York: Plenum. 353-375.

Rafats, J. 1992. **Gypsy moth (*Lymantria dispar*) and its control.** January 1979 - October 1991. Quick Bibliography Series: QB 92-17. Beltsville, MD: National Agricultural Library. 57 p.

Schaefer, P.W.; Ikebe, K.; Higashiura, Y. 1988. **Gypsy moth, *Lymantria dispar* (L.), and its natural enemies in the Far East (especially Japan).** Annotated bibliography and guide to the literature through 1986 and host plant list for Japan. Delaware Agric. Exp. Stn. Bull. 476. Newark, DE: University of Delaware. 160 p.

United States Government Printing Office. 1984. **United States Government Printing Office style manual.** Washington, DC: U.S. Government Printing Office. 436-441.

University of Chicago Press. 1993. **Transliterated and romanized languages.** *In*: The Chicago manual of style, 14th ed. Chicago: University of Chicago Press: Chicago: 345-348.

Annotated Citations

1 Abdullaev, A.A. 1968.
Effect of pseudoallicin on gypsy moth larvae. In: Naukovi pratsi USGA. Dostidzhennya z fitopatologii ta entomologii. Kiev: 100-101.
-- Pseudoallicin, a synthetic analogue of allicin, was bioassayed in the laboratory on instar II-IV gypsy moth. Treatment with pseudoallicin caused growth inhibition and death of the larvae. The signs of poisoning are described in detail.
MAsia; BIOASSAY, NATURAL PLANT PRODUCTS, PHYSIOLOGY

2 Abdullaev, A.A. 1969.
Irregular larval activity in the gypsy moth and tent caterpillar caused by pseudoallicin. Avtoreferat dissertatsii kandidata biologicheskikh nauk. Kiev. 24 p.
-- The effect of allicin-type compounds on larvae of gypsy moth and tent caterpillars was studied by applying phytoncide solutions to the foods and body of the insects. The experiments showed significant changes in behavior, slower growth and development, lower fertility, and reduced egg vitality. In addition, pseudoallicines cause histophysiological changes in the neurohumoral system including an increase in the amount of protective and pathological cells. Prolonged application leads to the death of the insects.
MAsia; BIOASSAY, HISTOLOGY, NATURAL PLANT PRODUCTS

3 Abdullaev, A.A. 1976.
Effect of experimental lots of microbial preparations on the gypsy moth. In: Nauchnyye trudy Ukrainskoy sel'skokhozyaystvennoy akademii. Zashchita rasteniy ot vrediteley i bolezney. USKhA, Kiev: 34-36.
-- The study of experimental lots of the biological preparations, entobacterin-17 and -K, dendrobacillin, beauverin, and exotoxin, on instar III-IV gypsy moth showed entobacterin-K and dendrobacillin to be the most effective preparations for infecting gypsy moth. Both caused 100% mortality of the insects at a concentration of 0.5 billion spores/ml. Entobacterin-17, at 0.5 billion spores/ml, caused 60% mortality of the larvae, while exotoxin and beauverin were weaker and less toxic.
MAsia; BACTERIA, FUNGI, BIOASSAY, MICROBIAL PESTICIDES

4 Abdullaev, A.A. 1979.
The effect of microbial preparations on pathologic changes in the hemolymph and gypsy moth survival. In: Nauchnyye trudy Ukrainskoy sel'skokhozyaystvennoy akademii. Zashchita rasteniy ot vrediteley i bolezney. USKhA, Kiev: 15-17.
-- Experimental lots of entobacterin-K, dendrobacillin, exotoxin, and entobacterin caused drastic changes in the structure and ratio of hemocytes, as well as death of treated third-instar gypsy moth. Low concentrations of the preparations caused similar, but more delayed, pathological responses of hemocytes.
MAsia; BACTERIA, HEMOLYMPH, MICROBIAL PESTICIDES

5 Abdullaev, A.A. 1980.
Modification of smear coloration for cytological studies of insect hemolymph. Vestnik zoologii. (4):75-76.
-- Intensity and quality of Romanovsky staining of hemocytes of gypsy moth larvae with azure-eosine were studied at different pH of the medium, using acetone and phosphate buffer solution. Distinct staining of nucleus chromatin and hemocyte cytoplasm was attained on phosphate buffer at pH = 6.55 in the presence of small amounts of acetone. The structure of hemocyte nucleus was seen very clearly as compact dark violet or violet-red chromatin granules. Cytoplasm of young cells and enocytoids were stained different shades of violet depending on the stage of development and the physiological condition of the cells. Enocytoid granulation became intensely violet, eosinophil granules turned dark red.
MAsia; HEMOLYMPH, HISTOLOGY

6 Abdullaev, Ye.N. 1966.
Egg parasites of the gypsy moth (*Lymantria dispar* L.). Uzbekskiy biologicheskiy zhurnal. (4):57-60.
-- Development of biological control is proposed in Samarkand Province since chemical and mechanical controls of the gypsy moth are labor intensive and inefficient. The parasites *Telenomus phalaenarum, Telenomus* sp., *Gryon howardi, G. dichropterum* destroyed gypsy moth eggs in several foci in the Amankutan Forest Enterprise. The chalcids, *Anastatus disparis* and *Ooencyrtus flavofascuitis* also parasitized eggs of the gypsy moth. *Ascolus saarovi, A. grandis,* and *Idris* sp. are parasites of insects but only use gypsy moth egg masses for overwintering.
MAsia; BIOLOGICAL CONTROL, EGGS, PARASITES

7 Abdullaev, Ye.N. 1966.
Entomophages of the gypsy moth (*Ocneria dispar* L.) in Uzbekistan. Avtoreferat dissertatsii kandidata biologicheskikh nauk. Samarkand. 16 p.
-- The gypsy moth is a major pest of fruit stands in Uzbekistan, particularly in mountainous localities. Data are presented on the phenology of the pest in the region. Oviposition usually took place on rocks and tree butts, but egg masses also were found on the trunks at a height of up to 4 meters. The favored food plants were poplar, elm, sweetbrier, and the fruit trees such as apple, apricot, and alycha. The author found 31 entomophages of the gypsy moth, 13 beetle species, 6 fly species and 12 lepidopterous species. The most effective egg parasites were *Telenomus phalaenorum, Habronotus howardi,* and *Anastasus disparis.* The most effective parasites of larvae and pupae were *Exorista rossica, Pimpla instigator* and *Brachymeria intermedia.* Predators of greatest importance were *Attagenus seniculus* and *Megatoma conspersa* which attack eggs, and *Calosoma sycophanta* and *C. auropunctatum dzungaricum* that attack larvae and pupae. The main task of gypsy moth control in Uzbekistan is to

enhance the efficacy of local entomophages by sowing additional nectariferous plants and timing the dates of chemical treatments to account for the flight season of major entomophages.
MAsia; BIOLOGICAL CONTROL, HOST PLANTS, OVIPOSITION SITE, PARASITES, PREDATORS

8 Abdullaev, Ye.N. 1967.
Egg parasites of the gypsy moth, *Lymantria dispar* L. (Orgyidae, Lepidoptera) with special reference to Samarkand Province. In: Poleznyye i vrednyye bespozvonochnyye zhivotnyye Uzbekistana. Tashkent: 25-29.
-- The species of egg parasites found during investigations carried out in 1963-1965 are given. The rate of infestation of gypsy moth egg masses varied greatly in the various forests and gardens. In general, *Telenomus phalaenarum, Habronotus howardi*, and *Anastatus disparis* appeared to be the most effective parasites and measures should be taken to introduce them to different parts of the area.
MAsia; EGGS, PARASITES

9 Abdullaev, Ye.N. 1967.
Biological characteristics of the gypsy moth in the forests of Samarkand Province. In: Voprosy zashchity rasteniy. Tashkent: 80-82.
-- Gypsy moth larvae in Samarkand Province start hatching after April 20 when the mean temperature is 14.1°C and relative humidity is 70%. Larval development takes 55-59 days. The first pupae appear in nature in mid-June and general pupation is observed at the end of June. Imago emergence and oviposition usually occur from the 1st to the 20th of June. The major food plants of the gypsy moth in Samarkand Province are apple, apricot, elm, willow, sweetbrier, hawthorn, poplar, and nut.
MAsia; DEVELOPMENT, HOST PLANTS, PHENOLOGY, TEMPERATURE

10 Abdullaev, Ye.N. 1970.
Some biological features of the gypsy moth in Uzbekistan. In: Vrediteli sel'skokhozyaystvennykh kul'tur Uzbekistana i ikh entomofagi. Tashkent: 118-120.
-- Observations carried out in 1964-1966 in Uzbekistan forests showed that nearly all the foci of gypsy moth are located along streambanks. Larvae damaged the trees and shrubs of 11 species. The major food plants were apricot, apple, poplar, and willow. Cherry, mulberry, and juniper were not damaged by the gypsy moth. Data on the pest phenology and places for oviposition are given, as well as a list of predators and parasites.
MAsia; FOCI, HOST PLANTS, OVIPOSITION SITE, PARASITES, PREDATORS

11 Abdullaev, Ye.N. 1972.
Some lepidopterous pests and their enemies in certain regions of Uzbekistan. In: Ekologiya i biologiya zhivotnykh Uzbekistana. Tashkent: 140-143.
-- Data are given on the biology and harmful effects of gypsy moth, grisette, leaf cutter and budworm and also the efficacy of parasites and predators of these pests.
MAsia; GENERAL BIOLOGY

12 Abdullaev, Ye.N., Popova, Ye.A., Norkulov, U. 1990.
Biological and ecological peculiarities of gypsy moth in Zeravshan valley. In: Uspekhi entomologii v SSSR: lesnaya entomologiya. Materialy X s"yezda Vsesoyuznogo entomologicheskogo obshchestva. Nauka, Leningrad: 136-138.
MAsia; GENERAL BIOLOGY

13 Abdurakhmanov, G.M. 1971.
Ecological and faunistical characteristics of pest insects of fruit crops in Dagestan Autonomous Republic (USSR). Avtoreferat dissertatsii kandidata biologicheskikh nauk. Makhachkala. 21 p.
-- In the gardens of Dagestan, the author found 137 pest species including 49 lepidopterous species. The gypsy moth is regarded as a secondary pest, attacking fruit plants only during outbreaks when its favored food plants are consumed.
Caucasus; PEST LIST

14 Abramenko, I.D., Samilyak, S.I. 1983.
Oak dieback in the ancient oak forest reserve Les ne Vorskle and in surrounding forest steppe woodlands. Lesovodstvo i agroleso-melioratsiya. 76:36-40.
EWest; TREE HEALTH

15 Ado, N.Yu., Petrov, N.B., Filippovich, Yu. B. 1985.
Repeating and unique DNA sequences in some species of Lepidoptera. Zhurnal evolutsionnoy biokhimii i fiziologii. 21:115-121.
-- Genome sizes of nine lepidopterous species were determined by measuring the reassociation kinetics of short DNA fragments. Genome sizes varied from 0.72 to 1.46 pg, with a modal value of 0.8 to 1.0 pg. The content of unique component does not exceed 50% of the genome. The size of the gypsy moth genome is 1.03 pg.
ECentral; GENETICS

16 Adzhemyan, L.A., Mirzoyan, V.S. 1989.
Protein fractions of the gypsy moth during feeding on various food species. In: Vklad uchenykh po zashchite rasteniy v nauchno-teknicheskiy progress. Erevan: 91-93.
Caucasus; BIOCHEMISTRY

17 Agafonova, P.S., Kvint, V.L., Timchenko, G.A. 1978.
The use of virin-ENSh preparation against a gypsy moth population. Lesnoye khozyaystvo. (1):86-88.
-- The work was carried out in Kherson Province in a 30-year-old stand of bastard acacia. The focus (initiation of the outbreak) appeared in 1972 and reached the outbreak phase in 1976. Egg masses were treated in about 5% of the area. The authors attribute the high mortality in the control and 100% mortality in the treatment areas to natural polyhedrosis in a collapsing pest focus rather than to the application of the preparation.
EWest; EGG MASSES, MICROBIAL PESTICIDES, VIRUS

18 Akimtseva, N.A. 1975.

The use of biopreparations in the gypsy moth foci. Zashchita rasteniy. (9):44.
-- Entobacterin and dendrobacillin were used to control the gypsy moth in Zakarpatye. Entobacterin was tested in the field for 10 years, from 1964 to 1974, and dendrobacillin was tested once, in 1973. The former preparation was highly efficient while the latter had low efficacy.
EWest; BACTERIA, MICROBIAL PESTICIDES

19 Aleksandrina, G.I. 1981.
Some patterns of the gypsy moth life cycles. In: Fauna i ekologiya chlenistonogikh Sibiri. Nauka, Novosibirsk: 118-119.
-- Changes in the duration of larval instars, dates of pupation, and emergence of adults were shown to be regulated by the neurohumoral system. A genetically determined factor seems to provide adaptation to certain ecological changes, preventing inbreeding when larvae hatch from one egg mass simultaneously. Biological rhythms affect the extraction into hemolymph of the activation hormone from the cardial bodies and determine the periodicity of the action of the molting hormone.
WSiberia; ENDOCRINOLOGY, GENETICS

20 Alekseeva, Ye.Ye. 1969.
The gypsy moth, *Ocneria dispar* L. (Lepidoptera, Orgyidae) in Buryatian ASSR. In: Trudy Buryatskogo filiala SO AN SSSR. Glavneyshiye vrediteli drevesnykh i kustarnikovykh porod Zabaykal'ya. Buriatskyi Filial SO AN SSSR, Ulan-Ude: 182-195.
-- Data are presented on gypsy moth outbreaks in Buryatia (1948-1951, 1954-1957, 1963-1966), gypsy moth biology, enemies, and economic significance. A list of 20 food plants is given. Larch is a favored food plant, followed by birch and willow, and primary foci occur in the stands of these three tree species. Larvae hatch in May, pupate at the end of July, and adults fly in late August to early September. Mortality in the foci due to entomophages and diseases was 80%. The author considers deposition of egg clusters on bare mountain slopes to be connected with ethological peculiarities of first instar gypsy moth (large scale dispersion).
ESiberia; DISPERSAL, HOST PLANTS, OUTBREAKS, OVIPOSITION SITE, PHENOLOGY

21 Aliev, A.A. 1967.
Entomophages of some garden pests in Nukhazakat zone of the Azerbaijan SSR. In: Materialy sessii Zakavkazskogo soveta po koordinatsii nauchno issledovatel'skikh rabot po zashchite rasteniy. : 432-433.
-- A complex of parasites was studied that attack larvae and pupae of the gypsy moth, apple leaf-trumpet moth, and garden leaf-rollers in Nukha-Zakatal region (Azerbaijan). The gypsy moth is considered to be one of the major garden pests in the area under study; it also attacks many forest plants. The main food plants are apple, cornel, oak, hornbeam, hawthorn, and medlar. In 1965 there was an outbreak of this pest, with more than 120 larvae and pupae of gypsy moth per tree. The following parasites were found: *Pimpla examinator*, Brachymeria sp. (Hymenoptera); *Exorista noctuarum*, and *Carcelia excisa*, along with sarcophagid and muscid flies (Diptera). Over 34% of larvae and pupae were attacked by flies and <2% by other parasites.
Caucasus; BIOLOGICAL CONTROL, NUMERICAL DATA, OUTBREAKS, PARASITES

22 Aliev, A.A. 1968.
On studying gypsy moth entomophages in Nukhazakat zone of Azerbaijan. In: Materialy sessii Zakavkazskogo soveta po koordinatsii nauchno issledovatel'skikh rabot po zashchite rasteniy. : 412-413.
-- Principal data on gypsy moth biology and entomophages are given.
Caucasus; GENERAL BIOLOGY

23 Aliev, A.A. 1984.
Some biocenotic interrelations among the main folivorous pests in the forests of Azrebaijan. In: Tezisy dokladov IX s"yezda Vsesoyuznogo entomologicheskogo obshchestva. Naukova Dumka, Kiev: 21.
-- Twenty-four parasites of gypsy moth, 25 parasites of leaf rollers and 12 parasites and predators of miners were found. The efficacy of entomophages of the gypsy moth and green oak leaf roller was 89%. Analysis of meteorological data showed that two gypsy moth outbreaks (1974-1978 and 1980-1983) occurred in warm, dry weather. Despite the high efficacy of gypsy moth entomophages, elimination of the foci of this pest in 1978 resulted mainly from the change in meteorological conditions, a temperature of 13.8° C, instead of the normal 17.5° C, which is usual for this season, and heavier than normal precipitation (an increase from 38 to 109 mm).
Caucasus; OUTBREAKS, PARASITES, TEMPERATURE, WEATHER

24 Aliev, A.A., Effendi, R.Ye., Mamedov, Z.M 1974.
Little known gypsy moth entomophages in Zakavkazye. Zashchita rasteniy. (5):36.
-- In the northeast of Azerbaijan, at the shores of the Caspian Sea, a gypsy moth outbreak was observed in 1971-1972 in 15,000 ha of beech and oak forests which also contained some alder, hornbeam, elm, poplar and wild fruit-bearing trees. Under certain conditions in March and April, small Lepidopteran larvae (possibly of the family Zyganidae) intensively fed on the eggs and hatched larvae of the gypsy moth. A fourth-instar could completely devour an egg mass of up to 800 eggs within 48 hours. The great numbers and voraciousness of predaceous lepidopteran larvae allows us to consider them as important enemies of the gypsy moth (in Azerbaijan). This species previously had not been regarded as entomophagous and cannibalistic. Gypsy moth egg masses also were heavily attacked by *Dermestes ater* and *D. lardarius* while larvae were consumed by *Calosoma sycophanta*.
Caucasus; EGGS, PREDATORS

25 Aliev, A.A., Mamedov, Z.M. 1970.
Results of investigation of garden pests entomophages in Azerbaidzhan. Doklady Akademii nauk Azerbaidzhanskoy SSR. 26(12):34-36.
-- Parasites of gypsy moth were: *Itoplectis alternatus, Pimpla turionellae, Pimpla inquisitorius, Meteorus*

versicolor, Apanteles melanoscelus, Brachymeria intermedia, Exorista larvarum, Parasetigena silvestris, Senometopia excisa, Blepharipa pratensis, Parasarcophaga portschinskyi.
MAsia; PARASITES

26 Al-Kabili, A.A. 1977.
A comparative study of the effect of organic phosphorous compounds and biopreparations on the tent caterpillar and the gypsy moth. Avtoreferat dissertatsii kandidata biologicheskikh nauk. Kiev. 25 p.
-- Some organic phosphorous compounds, microbiological preparations, and their binary mixtures affected the hemolymph, neurosecretory cells of the superesophageal ganglion, and the fat body of tent caterpillar and gypsy moth larvae. The effect of these preparations on insect development, survival, and fecundity also was studied. Individuals that had been exposed to treatment differed from the control in all of the biological parameters examined. Drastic changes in the hemolymph hemocytes occurred; i.e. the structure was disrupted, the ratio of forming elements was altered, and the amount of protective and pathological cells increased. Drastic pathological changes in the neurosecretory system of the larvae treated with insecticides show that insecticides inhibit hemolymph protective functions, destroy the neurohumoral complex, and exhaust the energy stores of the body.
EWest; CHEMICAL INSECTICIDES, TOXICOLOGY

27 Amirkhanov, D.V. 1976.
Gypsy moth in Bashkirian ASSR and experiments on disparlure application. In: Ispol'zovaniye khimicheskikh i biologicheskikh sredstv v bor'be s vreditelyami lesa. VNIILM, Moscow: 4-5.
-- To detect, count, and forecast gypsy moth populations with disparlure, experiments were done to determine effective concentrations. Two types of traps were used: cylinders with cone-shaped inserts, and flat sheets with a sticky surface. The experiments showed the cylinder to be the better trap and the optimum amount of pheromone to be 5.0 micrograms per trap.
EEast; PHEROMONE TRAPS

28 Amirkhanov, D.V. 1980.
Results of application of pheromone sticky traps for studying ecological patterns of the gypsy moth flight dynamics. In: Rol' dendrophil'nykh nasekomykh v tayezhnykh ekosistemakh. Tezisy dokladov Vsesoyuznoy konferentsii, Divnogorsk, 1980. Institut lesa i drvesiny SO AN SSSR, Krasnoyarsk: 4-5.
-- Pheromone traps were used to establish that in Bashkiria gypsy moth males fly most vigorously at a temperature of 16°C and higher and at a relative air humidity of 60% and lower. Low density populations in pure stands have a shorter flight season and are more energetic than high density populations in mixed stands. During the latent period, the gypsy moth does not disappear in some areas, remaining at a low population density; these are referred to as survival stations.
EEast; FLIGHT, MALES, PHEROMONE TRAPS, TEMPERATURE

29 Amirkhanov, D.V. 1981.
The study of biological activity of disparlure and prospects of its application for gypsy moth control. In: Sbornik nauchnykh trudov Bashkirskoy lesnoy opytnoy stantsii. Ufa: 97-106.
-- Efficacy of different concentrations of disparlure in gypsy moth foci was studied. For long-term counting of the pest population, cylindrical cone-end traps are more effective because the attractant is better preserved in them. The abiotic factors, temperature and wind force, as well as the state of the focus, influence the number of moths caught in traps. Pheromone traps can be used to predict pest population dynamics so that measures can be taken as soon as the population starts to increase.
EEast; PHEROMONE TRAPS, TEMPERATURE, WEATHER

30 Amirkhanov, D.V. 1983.
Biological activity of a disparlure and prospects of its application for gypsy moth control. Avtoreferat dissertatsii kandidata biologicheskikh nauk. Leningrad. 22 p.
-- Disparlure, a sex attractant of the gypsy moth, was tested at concentrations from 0.05 to 5.0 micrograms in traps of different types. Cylindrical traps baited with 5.0 micrograms of pheromone per trap were most effective. Disparlure can be particularly effective in controlling the pest population in a latent period and it can be used to control changes in the population dynamics of the gypsy moth.
EEast; PHEROMONES

31 Amirkhanov, D.V., Zubov, P.A., Krivonogov, V.P., Tur'yanov, P.A., Chernikova, O.P. 1981.
The use of disparlure and olefin for disorientation of male gypsy moth. In: Tezisy dokladov Vsesoyuznoy nauchno-tekhnicheskoy konferentsii. VNIILM, Moscow: 9-10.
-- In the experiments on disorientation of gypsy moth males carried out in Bashkiria, both disparlure and its predecessor, olefin, were used. The amount of disorientation was based on the number of moths caught with disparlure sticky traps in the plots exposed to treatment compared to the number in the control. Disorientation was 99.6% in the plot treated with disparlure and 100% in the plots treated with olefin. Olefin has a repellent effect for gypsy moth males, so it can be used together with disparlure to decrease the population density of the pest. The density of egg masses in the plot treated with olefin was always lower than in the control plot, but no reliable difference from the control was observed in the plot treated with disparlure. The authors attribute the lack of sterile egg masses in the experimental plots to males responding to both chemical and visual signals produced by the females in nature.
EEast; MATING DISRUPTION, PHEROMONES

32 Amirkhanova, S.N. 1962.
Nutritional substances in the leaves of vigorous and weakened gypsy moth hosts. In: Issledovaniya ochagov vrediteley lesa v Bashkirii. Ufa: 81-95.
-- According to data presented in the literature, gypsy moth larvae can feed on more than 275 plants species.

However, in Bashkiria, they prefer oak, birch, and aspen. It was noted that larvae concentrate in great numbers and develop better in the crowns of weakened trees. The chemical composition (proteins, soluble sugars, and starch) of healthy and weakened (diseased, injured) oak leaves was affected by unfavorable weather conditions and tree injuries.
EEast; FOLIAGE CHEMISTRY, HOST PLANTS

33 Amirkhanova, S.N. 1962.
Plant chemistry and gypsy moth survival. In: Nauchnaya konferentsiya po voprosam massovykh razmnozheniy vrediteley lesa. Ufa: 3-7.
-- The effect of nitrogen content in the leaves of food species on survivorship of gypsy moth larvae was studied. Admissible nitrogen content was found to be in the range of 12-23%, the optimum range being 17-18%. First-instar gypsy moth consumed somewhat more nitrogen (up to 23%). The optimum amount of nitrogen is different depending on the adjustment of the metabolism of different insect species. Activity of the enzyme systems of oak and birch after injury also was studied. Larvae were found to develop better on injured trees, but died on trees that earlier had been completely defoliated. Also considered is the role that specialized plant substances such as alkaloids, tannins, etc., play in the processes of feeding stimulation and metabolism of phytophages.
EEast; ENZYMES, FOLIAGE CHEMISTRY, NUTRITION

34 Anderson, M. 1880.
The gypsy moth in the second part of Schipovaya pine wood in Voronezh Region. Izvestiya vysshykh uchebnykh zavedeniy, lesnoy zhurnal. (2):125-131.
-- Detailed ecological characteristics of the gypsy moth life cycle are given. Females were found to oviposit on all sides of tree trunks and prefer dead, standing trees to living ones. There were no egg masses in young stands. Destruction of egg masses was suggested as the principal control measure.
ECentral; CONTROL, EGG MASSES, OVIPOSITION SITE, STAND COMPOSITION

35 Anderson, M. 1895.
Pest insects in the forests of Saratov Region. Izvestiya vysshykh uchebnykh zavedeniy, lesnoy zhurnal. (2):121-126.
ECentral; PEST LIST

36 Andreev, I.I. 1959.
Some biological patterns of the gypsy moth. In: Trudy Moskovskogo obshchestva ispytateley prirody im. N.K. Krupskoy. O pochvakh, dubravakh, neparnom shelkopryade i shmelyakh. Moscow: 57-61.
-- The gypsy moth is listed along with other pests of deciduous trees, primarily oaks, in the forests of Saratov Province.
ECentral; GENERAL BIOLOGY

37 Andreev, V. 1916.
Garden pest insects and yield prospects in Podol Region in 1916. Podol'skiy khozyain. (7-8):29-31.
-- The gypsy moth is listed among the pests of fruit-bearing species of Podolsk Province.
ECentral; PEST LIST

38 Andreeva, G.I., Lyashenko, L.I., Molchanova, V.A. 1976.
Vinylfosfat - a prospective insecticide. Zashchita rasteniy. (12):26.
-- Vinylphosphate, an analogue of Gardona™ (tetrachlorvinphos), is a contact stomach poison. When used against early gypsy moth instars it causes 96% to 98% mortality. Vinylphosphate was more efficacious than other preparations because of its longer residual activity.
EWest; CHEMICAL INSECTICIDES

39 Anichkova, P.G. 1971.
The theory of application attractants for gypsy moth control. In: Zashchita lesa ot vrednykh nasekomykh i bolezney. Moscow: 9-12.
-- Data are given on sexual activity of the gypsy moth in the Voronezh district, the number of copulations from males, the effect of repetitive matings on oviposition, and time of sexual activity of adults over a 24-hour period. These data form the basis for use of attractants to manage and control gypsy moth populations.
ECentral; MATING

40 Anichkova, P.G. 1972.
Study of the mating activity of the gypsy moth and the green oak tortrix for forest protective purposes. In: Trudy Vsesoyuznoy akademii sel'skokhozyaystvennykh nauk. Zashchita lesa ot vrediteley i bolezney. Moscow: 102-105.
-- Females and males of the gypsy moth reach sexual maturity at different times after eclosion. It takes at least 7-9 hours after eclosion before males can mate, while females can mate immediately. Males are most active 25-30 hours after eclosion. To oviposit, gypsy moth females need one, and sometimes two matings. More matings disturb normal oviposition. Males can copulate 7-8 times and fertilize 5-6 females.
ECentral; MATING

41 Anichkova, P.G. 1982.
Pheromones and their application for gypsy moth management and control in oak groves in the Central Chernozemye zone. (Feromony i ispol'zovaniye ikh dlya nadzora i snizheniya chislennosti neparnogo shelkopryada v dubravakh Tsentral'nogo Chernozemnogo rayona.) Voronezhskii Lesotekhnicheskii Institut, Voronezh. 31 p. (Deposited Document. VINITI N 2009-82 dep.)
-- Data are given on use of sex pheromones of gypsy moth for determining the flight season and control of population dynamics. During the eruption phase of an outbreak, disparlure at a concentration of 0.5 microgram and xylene extracts from wild and laboratory-reared females can be used. During the prodromic phase, disparlure concentration must be increased to 5-50 micrograms. The number of males caught in traps depended on weather conditions, time of the day, kind of attractant, and phase of species gradation. The numerical relationship between the number of males and the population density of the species in the stand (by egg masses) and the threat of defoliation was determined.

When the number of egg masses is 1.3-1.5 per tree and more than 300 males per trap are caught during the flight season, the threat of defoliation is 25-30% . When the number of gypsy moth egg masses decreases to 0.7-0.8 per tree and up to 100 males are caught in traps during the flight season, there is no threat of defoliation.
ECentral; EGG MASSES, MODELS, NUMERICAL DATA, PHEROMONE TRAPS, PROGNOSIS, SAMPLING

42 Anikina, Z.L. 1980.
Gypsy moth management. Zashchita rasteniy. (1):40.
-- It is suggested that traps with disparlure, a gypsy moth pheromone, should be widely used. Traps can be used to outline exactly the borders of the pest population over a large territory, to detect the beginning of an outbreak, and to predict harmful effects. A drawing of the trap is given.
ECentral; PHEROMONE TRAPS

43 Anonymous 1893.
The gypsy moth. In: Opisaniye naiboleye vrednykh lesam nasekomykh v yuzhnoy polose Rossii. Lesnoi departament, St.Petersburg: 7-8.
-- Twelve pest species, including the gypsy moth, are briefly described. Color tables are given.
ECentral; PEST LIST

44 Anonymous 1949.
The gypsy moth, *Ocneria dispar* L. In: Vrednyye zhivotnyye Sredney Azii. (Spravochnik). Moscow: 181-182.
-- The gypsy moth is regarded as a serious pest. Its ecology and ocurrence in Middle Asia are outlined.
MAsia; GENERAL BIOLOGY

45 Anonymous 1957.
The gypsy moth and measures for its control. (Neparnyy shelkopryad i mery bor'by s nim.) Vserossiiskoe obshchestvo sodeistviya okhrane prirody i ozeleneniju naselennykh punktov, Ramenskoe. 8 p.
-- General article that gives recommendations for gypsy moth control.
ECentral; CONTROL

46 Anonymous 1981.
A guide on methods of controlling the gypsy moth and on predicting its numbers in Moldavian forests. (Rukovodstvo po metodam nadzora za neparnym shelkopryadom i prognoza ego chislennosti v lesakh Moldavii.) Lesokhozyaistvennoe nauchno-proizvodstvennoe ob"edinenie "Moldles", Kishinev. 14 p.
-- Data are given on gypsy moth biology, phenology, and behavior in the forests of Moldavia. Also included is information on major food plants, survival stations, methods to monitor the period between outbreaks to predict future outbreaks, and pest control measures.
EWest; CONTROL, HOST PLANTS, PROGNOSIS

47 Anonymous 1988.
Detailed instructions for use of virus preparation virin-ENSh against gypsy moth in the garden. (Metodicheskiye ukazaniya po primeneniyu virusnogo preparata virin-ENSh v zashchite sada ot neparnogo shelkopryada.) OOP Ukrinformagroproma, Kiev. 10 p.
-- The pest is briefly characterized, and problems of biological methods, particularly application of a virus preparation, are discussed. Properties of the preparation of virin-ENSh and application technology are described. Methods are suggested to inventory gypsy moth, to estimate biological efficacy of the preparations, and to detect residual activity in the environment. The focal method of application of the virin-ENSh preparation was very effective, with pathogens remaining in the foci for 3 years. Economic and social implications are significant, since chemical treatments are reduced.
EWest; FOCI, MICROBIAL PESTICIDES, VIRUS

48 Apostolov, L.G. 1981.
Pest insect fauna of forest biogeocenosis of Central Pridneprovie region. (Vrednaya entomofauna lesnykh biogeotsenozov Zentral'nogo Pridneprov'ya.) Vischa shkola, Kiev. 231 p.
-- Gypsy moth foci in the Central Dnieper Region are described on pages 99-104. Fecundity ranges from 114 to 1015 eggs per cluster with an average of 394 eggs. In the ordinary black soil subzone, most egg masses are located on the butt of tree trunks, less than 1 m from the soil. In the brown soil subzone, gypsy moth females prefer to oviposit on the trunks of shrubs, *Acer tatarica* in particular. The northwestern side of trunks is preferred for oviposition. Species commonly defoliated are *Quercus robur* L. (early form), *Ulmus* spp., and cultivated Rosaceae trees. Moderately defoliated species are *Robinia pseudoacacia* L., and *Populus nigra* L. Less defoliated species are *Acer platanoides* L., *A. pseudoplatanus* L., *Tilia* spp., and the late form of *Q. robur* L. No defoliation occurred on *Fraxinus excelsor* L., *Gleditsia triacansha* L., and the shrubs *Syringa vulgaris* L., *Euonymus verrucosa* Scop., *E. europaea* L., *Amorpha fruticosa* L., and *Caragana arborescens* Lam. In the soil subzone, pupation takes place mainly in the lower part of the crown while in the brown soil subzone, it occurs in cracks and under loose bark of the trunk. Pupal development takes 15-22 days. Adult flight occurs mainly from mid-June to mid-July, but some males were seen at the beginning of August. There were seven predators of gypsy moth, especially *Calosoma sycophanta* L., *C. inquisitor* L., *Xylodrepa quadripunctata* L., and *Dermestes lardarius* F. There were fourteen parasites, especially *Anastatus disparis* Rusch. and *Meteorus versicolor* Wesm.
EWest; FECUNDITY, HOST PLANTS, OVIPOSITION SITE, PARASITES, PREDATORS

49 Aristov, M.T. 1932.
The gypsy moth. In: Vrednyye nasekomyye plodovogo sada. Sel'khozgiz, Moscow and Leningrad: 122-124.
-- All gypsy moth life stages are outlined. The author relates the occurrence of this pest in the USSR with the distribution of oak. Besides oak, the following food plants are mentioned: linden, birch, aspen, poplar, willow, alder, maple, beech, nut, apple, pear, cherry, plum, apricot, and ash. Herbaceous plants and conifers are eaten when the store of other food plants is exhausted. In Turkestan and Crimea, adults fly in June, in the middle part of the USSR they fly in July, and in the north (Kostroma, Leningrad

Province) they fly in late July. Egg masses are located mainly at the butt of the trunk, on the southern, windward side. The maximum size of an egg mass is 500 eggs. Hatching is observed to be prolonged and newly-hatched larvae stay in clusters and later disperse. Control measures include destruction of egg masses and chemical treatment of the trees when larvae are feeding.
EWest, ECentral, MAsia; CONTROL, EGG MASSES, HOST PLANTS, LIFE STAGE DESCRIPTIONS, OVIPOSITION SITE

50 Arkhangelskiy, P.P. 1925.
Studies on insect pests in Turkestan and plant protection against pests. Byulleten' postoyannogo bjuro Vserossiiskikh entomologicheskikh s'ezdov. 2(1):12-18.
MAsia; PEST LIST

51 Arkhangelskiy, P.P. 1941.
Fruit crop pests in Uzbekistan. (Vrediteli plodovykh nasazhdeniy Uzbekistana.) Gosizdat Uzbekskii SSR, Tashkent. 51 p.
MAsia; PEST LIST

52 Artamonov, S.D. 1980.
Landscape and biotopic location and trophic relations of the Far East sarcophagids. Izvestiya Sibirskogo otdeleniya Akademii nauk SSSR, seriya biologicheskikh nauk. 10(2):29-35.
-- *Agria punctata, Robineauella pseudoscoparia, Parasarcophaga harpax, Parasarcophaga tuberosa*, and *Parasarcophaga uliginosa* are among the gypsy moth parasites listed.
Far East; PARASITES

53 Artamonov, S.D. 1985.
The predaceous flesh flies (Diptera, Sarcophagidae) in the southern Far East. In: Fauna i ekologiya nasekomykh Primor'ya i Kamchatki. DNTs AN SSSR, Vladivostok: 11-24.
-- Trophic relations, geographical distribution, biotic fitness, and behavioral traits are considered for the larvae and adults of 21 species of Sarcophagidae. Eight species are gypsy moth parasites, *Agria monachae, A. affinis, Parasarcophaga harpax, P. subharpax, Robineauella pseudoscoparia, Kramerea schuetzei, Phallosphaera konakovi*, and *Sarcorohdendorfia antilope*. The species most active in gypsy moth foci are, *P. harpax, R. pseudoscoparia*, and *K. schuetzei* which destroyed from 25 to 44% of the pupae. In some foci, sarcophagids destroyed 92-93% of the pupae. Sarcophagids also attacked such dangerous pests as *Dendrolimus sibiricus*, fruit miner, and leaf-hopper. The author does not recommend the use of sarcophagids as a biological agent to control pests as they are inclined to synanthropization, with all the resulting consequences.
Far East; BIOLOGICAL CONTROL, PARASITES

54 Artyukhovskiy, A.K. 1958.
Examination of artificial infection of the gypsy moth larvae with the soil mermithid, Hexamermis albicans Sieb. In: Tezisy dokladov na Vsesoyuznom soveshchanii po pochvennoy zoologii. Izd. AN SSSR, Moscow: 37-40.
-- Mermithids of phyllophagous lepidopterous insects in the forests of Voronezh Province have been studied since 1952. Nine species of helminths in six genera were found. The gypsy moth was attacked by *Hexamermis albicans* and *Complexomermis elegans*. In the pest foci, total infection was 20%. Infection by mermithids was 20%, 20%, 15%, 4%, 1%, and 0%, respectively, for the first to the sixth instars. Less infection of the older larvae is accounted for by the emergence of the helminths. There were from 1 to 8 helminths per host. After the helminths emerged, 100% of the hosts died.
ECentral; NEMATODES, NUMERICAL DATA

55 Artyukhovskiy, A.K. 1960.
Biology of the nematode *Hexamermis albicans* Sieb., a parasite of some lepidopterous pests in Voronezh region. In: Nauchnyye zapiski Voronezhskogo lesotekhnicheskogo instituta. Voronezh: 49-52.
-- The biology is given of the mermithid, *Hexamermis albicans*, a parasite of gypsy moth, winter geometrid, green oak leaf roller, and other lepidopterous pests of deciduous species in the steppe zone. In some cases, 20 to 30% of caterpillars were parasitized and there were 7 to 8 parasites per host. Life cycle of this nematode lasts for a year and consists of 5 stages, embryonic, preparasitic, parasitic, and postparasitic (larval and imaginal). All life stages of the parasite are described.
ECentral; NEMATODES

56 Artyukhovskiy, A.K., Kharchenko, N.A. 1971.
Mermithid introduction within an area as a method of biological control of forest insect pest. In: Zashchita lesa ot vrednykh nasekomykh i bolezney. Moscow: 14-18.
-- Mermithids are effective parasites of many insects such as Orthoptera, lamellicarn beetles, and Lepidoptera including the gypsy moth. From 40 to 100% of the hosts are infested with up to 30 parasites per host. Introduction of mermithids is a preventive measure for limiting the pest population. When parasites are introduced into different parts of the area, it is important to consider their ecological needs of soil quality, humidity, and vegetation cover.
ECentral; BIOLOGICAL CONTROL, NEMATODES, PEST LIST

57 Ashimov, K.S. 1987.
Distribution patterns of gypsy moth egg masses in nut forests of south Kirgizia. In: Ecologiya i zashchita lesa. Leningradskaya lesotekhnicheskaya akademiya, Leningrad: 61-64.
MAsia; OVIPOSITION SITE, SAMPLING

58 Ashimov, K.S., Marushina, N.G. 1986.
Gypsy moth in nut forests of south Kirgizia. In: Nauchnyye trudy Moskovskogo lesotekhnicheskogo instituta. MLTI, Moskva: 138-140.
-- Reports are given of aggregations of various pest species in the nut forests of Kirgizia, with their subsequent invasion into agrocenoses. High concentrations of pests on different plant species, including orchards, is due to the purity of stands as well as to heavy application of chemical insecticides that kill parasites and predators.

Data on certain species in connection with the dates of treatment also are included.
MAsia; CHEMICAL INSECTICIDES, STAND COMPOSITION

59 Avakyan, G.D. 1956.
Entomofauna of forest shelter belts in Armenia. In: Zoologicheskiy sbornik. Erevan: 59-124.
-- The gypsy moth is mentioned as a pest of forest shelter belts in Armenia. Its favored host is Elaeagnus angustifolia. An outline of the pest ecology is included.
Caucasus; ECOLOGY, HOST PLANTS

60 Avdeeva, Ye.A. 1936.
Leaf chewing pest insects of silvicultural plantations of the USSR. In: Glavneishiye vrediteli i bolezni sel'skokhozyaystvennykh kul'tur v SSSR, obzor za 1935 g. Leningrad: 382-396.
-- The gypsy moth is listed among seven major phyllophages. Its outbreaks were observed in eastern parts of forest steppe and steppe regions of the USSR (Ukraine, the Volga banks, Georgia, Kazakhstan, Uzbekistan). There are foci with very high population density and 100% defoliation. High population density of the pest is predicted for 1936.
EWest, ECentral, MAsia; DISTRIBUTION

61 Averin, V.G. 1912.
Pest damage expected in 1913. Entomologicheskiy i fitopatologicheskiy zhurnal Khar'kovskoy gubernii. (1):1-6.
-- The gypsy moth is mentioned along with other agricultural and forest pests. The increase in its population density in some foci is considered to be a potential source of forest injury.
EWest; PROGNOSIS

62 Averin, V.G. 1912.
Pest group described in Charkov Region in 1912. Entomologicheskiy i fitopatologicheskiy zhurnal Khar'kovskoy gubernii. (1):10-65.
-- The gypsy moth is mentioned as one of the pests of tree and shrub stands in Kharkov Province. Ecology and morphology of the pest, the principal food species, and control measures such as scraping off egg masses and treating them with petroleum, are described briefly.
EWest; GENERAL BIOLOGY

63 Averin, V.G. 1913.
Pest control on fruit trees in autumn. Entomologicheskiy i fitopatologicheskiy zhurnal Khar'kovskoy gubernii. (7):1-4.
-- Collecting and burning of egg masses of the pest or treating egg masses with petroleum are recommended measures of gypsy moth control.
EWest; CONTROL, EGG MASSES

64 Averin, V.G. 1919.
The main pests of silvicultural plantations and their control. (Vazhneyshiye vrediteli sel'skokhosyaystvennykh kul'tur i mery bor'by s nimi.) Izdatel'stvo Sojuz, . 142 p.
-- The gypsy moth is listed among 12 species of lepidopterous pests of plantations. Data on the species ecology are given in brief, and the outbreak of 1910-1911 is described. Recommended ways to control gypsy moth are collecting and destroying the egg masses, and putting sticky belt traps around tree trunks during the hatching period.
EWest; CONTROL, ECOLOGY

65 Averin, V.G. 1925.
What do we expect in 1925? Zakhyst roslin. (1-2):8-11.
-- Prediction of the population levels of some agricultural pests including the gypsy moth is made. Considerable increase in the population of the gypsy moth has been observed in the stands of Kharkov Province where previously only individual specimens could be found. It is suggested that an outbreak could occur and that attention should be given to the situation.
EWest; PROGNOSIS

66 Averkiev, I.S. 1939.
Study of the gypsy moth in the forests of Middle Povolzhye. Lesnoye khozyaystvo. (11):50-53.
-- Gypsy moth population dynamics were followed in several regions of the European USSR in the 1930s. In the Crimea, outbreaks were noted in 1930-1931. In 1932-1935, high population levels of the pest were observed in the lower reaches of the Volga River, in Kuibyshev, Gorki, and Odessa Provinces, and in Tatar, Chuvash, Mari, and Bashkir Autonomous Republics. A second, weaker outbreak was observed in Tataria in 1937. Both outbreaks in Tataria occurred after dry years. Data are given on phenology of the pest in Tataria, behavior of females during oviposition, and the locations where foci take shape. Parasites are noted as causing significant damage to the pest population; more than 80% mortality was observed in the foci due to entomophages and diseases. Injured trees had a loss of increment but no tree mortality was observed in the foci.
ECentral, EEast; FOCI, OUTBREAKS, TREE HEALTH

67 Averkiev, I.S. 1939.
On role of the common hill ant, *Formica rufa* L., in the foci of gypsy moth, *Porthetria dispar* L. Priroda. (10):70-71.
-- From brief observations made during a gypsy moth outbreak, it was concluded that foraging of the red ant, *Formica rufa* L., destroys a great number of tachinid parasites of the gypsy moth, but the ant does not attack the pest larvae. Hence, the author believes that in the foci of the gypsy moth, ants have a positive effect on the pest population.
ECentral; PARASITES, PREDATORS

68 Averkiev, I.S. 1939.
Study of egg masses and eggs of the gypsy moth (*Porthetria dispar* L.). In: Sbornik trudov Povolzhskogo lesotekhnicheskogo instituta. Yoshkar Ola: 76-88.
ECentral; EGGS, EGG MASSES

69 Averkiev, I.S. 1940.
Gypsy moth oviposition sites. In: Sbornik trudov Povolzhskogo lesotekhnicheskogo instituta. Yoshkar Ola: 110-122.
-- Data are given on the distribution of gypsy moth egg masses in the stands of the Middle Reaches of the Volga

River. Females are noted to oviposit mainly on the butt of the tree (20 cm to 25 cm). Oviposition above 1 m was observed in "plavnis" (willow stands) and could be due to higher humidity. Females also appeared to prefer sheltered places for ovipositing. When they oviposited on exposed tree trunks, they chose the south side. In foci, gypsy moth egg masses can be found on every tree species, but birch and linden are preferred. The food plant most preferred by the gypsy moth is oak, followed by birch, apple, and aspen. The population level of the pest first increases on the southern slopes of hills and at the forest edges. In the course of an eruptive phase, foci shift to the northern slopes and to the plains. Parasites and diseases are of great importance for controlling the population.
ECentral; HOST PLANTS, OVIPOSITION SITE, SITE CONDITIONS

70 Averkiev, I.S. 1984.
Atlas of the most dangerous forest insects. (Atlas vredneyshikh nasekomykh lesa.) Lesnaya promyshlennost', Moscow. 72 p.
-- A reference book with 32 color tables depicting more than 100 species of the most harmful forest insects, including the gypsy moth. Distribution, behavior, and control measures are given.
EWest, ECentral, EEast; PEST LIST

71 Avetyan, A.S. 1952.
***Porthetria dispar* L. (*Lymantria, Ocneria dispar*) - the gypsy moth.** In: Vrediteli plodovykh kul'tur Armyanskoy SSR. Izd. AN Armyanian SSR, Erevan: 120-121.
-- This pest can be found almost everywhere in Armenia. It attacks forest species and orchards, including apple, pear, quince, plum, elaeagnus, and cherry. The distribution of egg masses is different in different years. Usually, egg masses were located on the trunks and thick boughs, but some egg masses were found under loose stone walls, and contained from 75 to 332 eggs. Larvae hatched in late April or early May, pupation took place from late June to early July, and adults fly in August. Larvae fed at night and during the day found shelter under loose bark at the butt of the tree, in stone walls, and other dark places in clusters of 20 to 30 individuals; pupation takes place under stones. Larvae generally feed on leaves, but during outbreaks they also eat fruit.
Caucasus; FECUNDITY, HOST PLANTS, OVIPOSITION SITE

72 Avramenko, I.D., Prokopenko, N.I., Mezentsev, A.I., Kucheryavenko, V.I., Minyaylo, V.G. 1981.
Effect of insect pests on the establishment and productivity of oak stands. In: Noveyshiye dostizheniya lesnoy entomologii. Vilnjus: 4-6.
-- The sequence in the decline in health of English oak in the Ukraine is described as beginning with defoliation in May and June followed by mildew of 80% of the new leaves. This causes loss of resistance to xylophages and fungi, no late wood formation and loss of resistance to low temperatures.
EWest; TREE HEALTH

73 Avtukhovich, Ye.V., Belov, A.N. 1988.
Effect of defoliation on radial wood growth of an oak tree. Izvestiya Timiryazevskoy sel'skokhozyaistvennoy akademii. (2):192-196.
-- Radial growth dynamics of wood was studied in middle-aged second oak growths in the Saratov Province that are attacked every year by a phyllophagous complex, primarily the green oak leaf roller and the gypsy moth. The degree of leaf injury caused by phyllophages and the hydrothermal conditions in May and June were regressed on the growth loss. Total growth loss was 63.4%, of which more than half was accounted for by the regression analysis on the activity of phyllophagous insects.
ECentral; TREE GROWTH

74 Azimov, T.N. 1982.
Entomophages of the gypsy moth. Zashchita rasteniy. (2):1-41.
-- Natural enemies in the families Telenomidae, Braconidae, Pteromalidae, Dermestidae, and Carabidae, were most effective in the mountain ranges of Uzbekistan. *Calosoma* spp. were especially important. In 1977, an outbreak of the gypsy moth in Tashkent Province was almost completely suppressed principally by *Calosoma sycophanta*. On each tree infested by gypsy moth larvae, there were 3 to 8 beetles. When given a choice in the laboratory, *C. sycophanta* always preferred gypsy moth larvae to silkworm, hawthorn moth, and leaf-trumpet larvae.
MAsia; PARASITES, PREDATORS

75 Baganich, M.I. 1968.
The ecological and biological features of the main leaf-eating insects in the forests of Carpathians. In: Zakhist Karpats'kikh lisiv vid khvorob i shkidnikiv. Uzhgorod: 31-37.
-- There are as many as 300 oak-related insect species but in Zacarpatye Province the following species are of the greatest importance: gypsy moth, tent caterpillar, oak eggar, browntail moth, winter geometrid, and green oak leaf roller. In Zacarpartye Province, the gypsy moth is heavily attacked by Diptera sp. and Hymenoptera sp. parasites. The tent caterpillar is often attacked by parasites and diseases, and leaf rollers are often attacked by ichneumonids and tachinids.
EWest; PARASITES, PEST LIST

76 Baganich, M.I. 1968.
Prospects of biological control of folivorous forest pests. In: Zakhist Karpats'kikh lisi vid khvorob i shkidnikiv. Uzhgorod: 83-88.
-- The biopreparation, entobacterin-3 from *Bacillus cereus galleriae*, was used in its pure form and with insecticides on larvae of the gypsy moth, the browntail moth, and the green oak leaf-roller. In the laboratory, the mortality of larvae living in the open was 100%, the mortality of early instars of the leaf roller instars was 80% to 90%, the mortality of late instars was 20% to 40%. In the field, the mortality of leaf roller larvae was 30% to 45%. When pesticides were added, mortality increased. Entomophages of the pests did not die when bacterial preparations were used.
EWest; BACTERIA, MICROBIAL PESTICIDES,

MORTALITY

77 Baganich, M.I. 1981.
Oak defoliators and their control measures in the conditions of Zacarpatye Region. In: Noveyshiye dostizheniya lesnoy entomologii. Vilnjus: 6-9.
-- About 40 insect species, 30 of which are Lepidoptera, are considered to be pests of oak in Zakarpatye Province. One of the most important phyllophages is the gypsy moth, which has regular outbreaks in the forests of the Province. Chemical control has not reliably protected oak groves because the complex of phyllophages present has asynchronous development. Moreover, application of highly toxic insecticides resulted in the elimination of most entomophages, thus causing deterioration of the state of forest cenoses and longer outbreaks. The author suggests using biological preparations in their pure form or with small amounts of pesticides to control a complex of lepidopterous pests.
EWest; CONTROL, PEST LIST

78 Baganich, M.I. 1988.
The gypsy moth, a pest of oak groves in the Carpathians. In: Neparnyy shelkopryad: itogi i perspektivy issledovaniy. Krasnoyarsk: 21-22.
-- In the region of the Ukrainian Carpathians, the gypsy moth is abundant in Zakarpatye and Chernovtsy Provinces. As a rule, its harmful effect is manifested in the weakening of broad-leaved forests growing close to towns and villages. The favored food plant is oak but when the population level is high larvae also feed on the leaves of other available species: hornbeam, beech, linden, wild fruit- bearing trees, hawthorn, blackthorn, and even on the grass in the forest. Hatch takes place in late April-early May when early oaks come into leaf and blackthorn is in blossom. If there is a choice of food species larvae prefer the one on which their parental generation developed. Late instars are mostly dark-grey and light-grey, there are fewer red-yellow larvae, and few individuals have only a black stripe along the back. Pupation lasts from mid-June to mid-July under various shelters. Female fecundity is up to 1500 eggs, with an average egg weight 0.49-0.82 mg. The main parasites are *Parasetigena silvestris, Compsilura concinnata, Apanteles liparidis, A. solitarius, Pimpla* sp., *Apechtis* sp., and *Trogus* sp. This complex of parasites destroys up to 90% of the pest population. Active predators are bugs *Allothrombium fuliginosum, Calosoma* and *Xylodrepa quadripunctata* beetles.
EWest; COLOR POLYMORPHISM, FECUNDITY, HOST PLANTS, PARASITES, PREDATORS

79 Baganich, M.I., Meshkova, V.L. 1980.
The use of the virin-ENSh virus preparation for gypsy moth control in oak groves of Zakarpatye Region. In: Tezisy dokladov 2-go s"yezda Ukrainskogo entomologicheskogo obshchestva. Uzhgorod. Issledovaniya po entomologii i akarologii na Ukraine. Kiev: 176-177.
-- The preparation was effective when egg masses were sprayed before the greater part of gypsy moth larvae hatched. The efficacy was 84-86 %. Treatment of egg masses made hatching more active but larvae stayed on the surface of egg masses longer, started feeding unwillingly, and lagged behind control larvae in growth and development. Insects died throughout the life cycle of the pest.
EWest; EGG MASSES, MICROBIAL PESTICIDES, VIRUS

80 Bahmetyev, P.Ye. 1902.
The gypsy moth. Trudy Russkogo entomologicheskogo obshchestva. 35:356-466.
-- Gypsy moth adults were common during July-August in Sofia, Bulgaria. In the spring of 1900, 45 foresters officially reported that larvae were numerous in a many forests but they died due to wet, cold weather.
EWest; WEATHER

81 Bakhvalov, S.A. 1989.
The use of baculovirus and the bacterial prepapation "lepidocide" for suppression the nun moth foci *Lymantria monacha* L.: results and perspectives. In: Biologicheskaya i integrirovannaya bor'ba s vreditelyami v lesnykh biotsenozakh. Moscow: 139-145.
-- Nuclear polyhedrosis virus and "lepidocide" were tested in the pest foci in pine stands of West Siberia and Kazakhstan. It was only in the foci at the eruption phase that protective measures using a nuclear polyhedrosis virus were successful. Efficiency of lepidocide was highest (79.4%) at the eruption phase of an outbreak. The advantage of lepidocide is that it has a shorter incubation period (about 5 days) than the nuclear polyhedrosis virus. Lepidocide, however, has a slight negative effect on natural enemies of the pest while nuclear polyhedrosis virus is harmless for parasites and predators. A combined application of a nuclear polyhedrosis virus and lepidocide was better than their separate applications.
WSiberia, MAsia; MICROBIAL PESTICIDES, VIRUS

82 Bakhvalov, S.A., Bakhvalova, V.I., Larionov, G.V. 1981.
Development of virus infection in hemocytes of gypsy moth larvae and their hemogram dynamics during nuclear polyhedrosis disease. In: Fauna i ekologiya chlenistonogikh Sibiri. Nauka, Novosibirsk: 133-136.
-- In gypsy moth larvae, a nuclear polyhedrosis virus first affects plasmocytes, then granulocytes and endocytes. The work was carried out on a laboratory culture. The course of disease was observed for larvae infected in the third-instar and for larvae exposed to an extreme temperature, 2° C, for 48 hours. No differences in hemocyte injury dynamics or virus morphogenesis in the larvae of either group were found. When the larvae were infected or when the latent infection was activated, high variability of the hemocyte formula was observed; therefore no statistically reliable data were obtained.
WSiberia; HEMOLYMPH, HISTOLOGY, VIRUS

83 Bakhvalov, S.A., Bakhvalova, V.I., Larionov, G.V. 1981.
Nuclear polyhedrosis in the gypsy moth (*Lymantria dispar* L., Lepidoptera: Lymantriidae): development of virus infection in hemocytes and dynamics of hemogram changes. Izvestiya Sibirskogo otdeleniya

Akademii nauk SSSR, seriya biologicheskikh nauk. 15(3):132-140.
-- Larvae under experiment were either infected with polyhedrosis, fed with food treated with polyhedral suspension, or latent virus infection was activated by exposure to cold temperature. Two days after infection, withdrawal of hemolymph was started and hemograms were made. After 4 days, definite changes in the hemogram were observed, which is evidence of developing virus infection. The course of disease is similar in both cases, but it is slower when the latent virus is activated.
WSiberia; HEMOLYMPH, VIRUS

84 Bakhvalov, S.A., Bakhvalova, V.N., Larionov, G.V. 1982.
The polykarycytes in the hemolymph of gypsy moth, *Lymantria dispar*, larvae with nuclear polyhedrosis. Izvestiya Sibirskogo otdeleniya Akademii nauk SSSR, seriya biologicheskikh nauk. 2:125-129.
WSiberia; HEMOLYMPH, VIRUS

85 Bakhvalov, S.A., Devet'yarova, S.V. 1980.
Morphogenetic features of baculoviruses during general polyhedrosis of some Lepidoptera at infection. Izvestiya Sibirskogo otdeleniya Akademii nauk SSSR, seriya biologicheskikh nauk. (1):58-65.
-- Insects were orally infected with nuclear polyhedrosis viruses administered with food or with a micropipette. Disease signs become evident when the virus invades large numbers of fat body cells, tracheal epithelium, hypodermis and hemocytes. No virus replication was observed in muscle or nerve cells, precursors of sex cells, cells of silk glands, or Malpighian tubules.
WSiberia; HISTOLOGY, VIRUS

86 Bakhvalov, S.A., Larionov, G.V., Bakhvalova, V.N. 1982.
Microscopic study of induced baculovirus infection dynamics in the gypsy moth larvae (*Lymantria dispar* L., Lepidoptera: Lymantriidae). Molekulyarnaya biologiya. 31:64-73.
-- After latent virus infection is activated in the larvae by cooling, nuclear polyhedrosis virus replication starts in epithelial cells of the trachea and the fat body. Somewhat later, a similar process occurs in the hypodermis and hemocytes. First, the virus multiplies in solitary tissue cells mosaically as islands, later infection spreads throughout the tissue. Still later, the virus multiplies in epithelial cells of tracheas and trophocites inside different organs, thus providing further generalization of infection. No synthesis of the virus in muscle, nerve, or sex cells, as well as silk gland cells and Malpighian tubules was observed. In some virotropic cells the virus multiplied in cytoplasm.
WSiberia; HISTOLOGY, VIRUS

87 Bakhvalov, S.A., Larionov, G.V., Bakhvalova, V.N. 1982.
Recovery of *Lymantria dispar* L. (Lepidoptera: Lymantriidae) after artificial virus infection. Entomologicheskoye obozrenie. 61(4):755-758.
-- Some part of the insects infected with a nuclear polyhedrosis virus stopped developing. Although the virus multiplied in hemocytes after infection, no virus was found in the imaginal stage. No reliable differences in the fecundity of the insects or of the controls after infection were revealed.
WSiberia; FECUNDITY, HISTOLOGY, VIRUS

88 Ballion, Ye.Ye. 1873.
The most dangerous agricultural insects in Kherson Region. In: Sbornik Khersonskogo zemstva. Kherson: 21-26.
-- Among other major pests of horticulture, the author mentions the gypsy moth.
EWest; PEST LIST

89 Bal'man, R.A., Azizbekyan, P.P. 1988.
Physical and chemical peculiarities of bacteriophages in crystal forming microorganisms used for gypsy moth control. In: Neparnyy shelkopryad: itogi i perspektivy issledovaniy. Institut lesa i drevesiny SO AN SSSR, Krasnoyarsk: 34-35.
-- The strains of *Bacilus thuringiensis* H-I-insectus used to control gypsy moth populations are resistant to many phages of other serotypes of the species. To extend the range of phages lysing certain strains, 14 phage strains were extracted from different elements (soil, litter, needles) of forest biocenoses in Tuva. By the phage reference, they have morphology of groups A-I, B-I. According to their structural peculiarities, phages are divided into 3 subgroups. The study also has shown that phages that are morphologically analogous, belonging to one bacterial species, can have certain domains of homology in DNA molecules.
WSiberia; BACTERIA, MICROBIAL PESTICIDES

90 Balog, A.Ya. 1968.
Changes in neurosecretory brain cells of lepidoptera during insecticide application. In: Naukovi pratsi USGA. Borot"ba z shkidnikami ta khvorobami roslin. USKhA, Kiev: 74-79.
-- When fifth-instar browntail moth, gypsy moth, tent caterpillar, and silkworm are treated with DDT or chlorophos rogor, changes occur in the structure and morphology of medial neurosecretory cells. Protoplasm granulation becomes much less pronounced, and neurosecretory granules coalesce to yield a structureless homogenous mass. Neurosecretory cells swell and eventually become partially elongated. Medial neurosecretory cells of normal larvae are observed to produce neurosecreta; this is not seen in larvae treated with insecticides.
EWest; CHEMICAL INSECTICIDES, NEUROLOGY

91 Baranchikov, Yu.N. 1980.
Effect of feeding preference in phytophagous insects: energetic approach. In: Rol' dendrophil'nykh nasekomykh v tayezhnykh ekosistemakh. Tezisy dokladov Vsesoyuznoy konferentsii, Divnogorsk, 1980. Institut lesa i drvesiny SO AN SSSR, Krasnoyarsk: 8-9.
-- Experiments carried out on larvae of satin moth, gypsy moth, and *Dendrolimus sibiricus* showed that insects developing on a certain plant species utilized the food

more effectively than those fed leaves of different plant species. When the food species is changed, digestive and detoxication systems of the larvae are "readjusted" and a certain amount of energy is needed each time. Having a choice, Lepidoptera larvae often were observed to refuse to change to new, even more favorable food, preferring to feeding on the one previously offered.
WSiberia; BEHAVIOR, ENERGETICS, FEEDING, NUTRITION, REARING

92 Baranchikov, Yu.N. 1981.
Energy expenditures in gypsy moth, *Lymantria dispar*, larvae during food plant change. Vestnik zoologii. (1):81-82.
-- A significant decrease in relative growth rate due to increased metabolic costs was observed when 4th instar gypsy moth were switched from birch leaves to larch needles. No such decrease occurred when larvae were switched from bird cherry to larch. Bird cherry and larch have more biologically active secondary compounds than birch.
WSiberia; BEHAVIOR, ENERGETICS, FEEDING

93 Baranchikov, Yu.N. 1981.
Mechanisms of preadaptation to new food plants by the larvae of dendrophilous Lepidoptera. In: Biologicheskiye aspekty izucheniya i ratsional'nogo ispol'zovaniya zhivotnogo i rastitel'nogo mira. Riga: 319-321.
-- Experiments have shown that energy losses occurring when food of the larvae is changed depend on the activity level of insect microsomal oxidases, which are induced by a set of secondary compounds (allelochemicals) of the previous food plant. For the larvae to switch from biologically active food containing a lot of allelochemicals to a more "biologically passive" food plant is less energy consuming than vice versa. The study confirmed the fact that microsomal oxidases become more active as gypsy moth larvae grow older. This phenomenon is also observed in larvae of other dendrophilous Lepidoptera. Less energy is consumed by older larvae in adapting to a different food substrate. This can be regarded as preadaptation to extending the range of food plants. This phenomenon also may account for higher survivorship of late instars treated with organic insecticides compared to survivorship of early instars.
WSiberia; ENERGETICS, NUTRITION, PHYSIOLOGY, REARING

94 Baranchikov, Yu.N. 1982.
Patterns of food consumption and utilization by the gypsy moth during artificial change of food plant species. In: Neparnyy shelkopryad v Sredney i Vostochnoy Sibiri. Nauka, Novosibirsk: 19-35.
-- When the food plants are changed in experiments on gypsy moth larvae, consumption and utilization of the food undergo considerable changes. Larvae fed on a new species consume more food on the second day than on the first day. Previous food effects consumption as well as its contribution to growth. In addition to the peculiarities mentioned, some other ethological and physiological responses to food change are discussed.
WSiberia; ENERGETICS, FOLIAGE QUALITY, NUTRITION

95 Baranchikov, Yu.N. 1983.
Intrapopulation differences in development of induced trophic behavior in the gypsy moth. In: Dinamika chislennosti i rol' nasekomykh v biogeotsenozakh Urala. UNTs AN SSSR, Sverdlovsk: 3-4.
-- After a week of feeding either on willow leaves or on larch needles, the diet of first instar Siberian and Ukrainian gypsy moth populations was changed to larch needles. As a result, the larvae exhibited induction of feeding preference in relation to the original food plant. Different levels of adaptation to feeding on larch determined the direction of trophic induction in the individuals of different populations. It caused preference induction in Siberian larvae and rejection induction (food aversion learning) in Ukrainian larvae.
WSiberia, EWest; BEHAVIOR, FEEDING

96 Baranchikov, Yu.N. 1983.
Sensory basis of feeding preference induction in gypsy moth larvae. In: Issledovaniye komponentov lesnykh biogeotsenozov Sibiri. Institut lesa i drevesiny SO AN SSSR, Krasnoyarsk: 6-7.
-- Realization of feeding preference induction is experimentally shown to be determined by the information input on maxilla taste receptors of fifth instar gypsy moth larvae.
WSiberia; BEHAVIOR, FEEDING, PHYSIOLOGY

97 Baranchikov, Yu.N. 1983.
The efficiency of consumption of detached needles of the Siberian larch by insects. Izvestiya Sibirskogo otdeleniya Akademii nauk SSSR, seriya biologicheskikh nauk. (3):112-115.
-- The efficiency of consumption of detached larch needles (the weight of ingested biomass divided by the weight of detached needles) by different species of insects is correlated with their feeding specialization: monophages are more effective. Polyphagous gypsy moth larvae drop to the ground a biomass of needles that is 700 times higher than they consume during instars 1-3, and a biomass that is 10 times higher during instars 5-6.
WSiberia; BEHAVIOR, ENERGETICS, FEEDING

98 Baranchikov, Yu.N. 1983.
Ecological heterogeneity of forest plant shoots and insect herbivory. In: Rol' vzaimootnosheniy rasteniye-nasekomoye v dinamike chislennosti populyatsiy lesnykh vrediteley. Institut lesa i drevesiny SO AN SSSR, Krasnoyarsk: 49-72.
-- The nutritional value of an individual leaf depends not only on its age, but also on its position on the shoot. The author studied the dynamics of leaf growth and changing biochemical composition of neighboring leaves on shoots of trees and shrubs in Siberia. It was shown that the higher the number of the leaf on the shoot (counting from its base), the lower the secondary metabolite concentrations; their growth rate and maturing (comparing the equal stages of leaves' development) also is slower. In free choice tests, final instars of polyphagous lepidopterans (gypsy moth among them) prefer mature leaves, while those of oligo- and monophages prefer

young ones. This tendency is pronounced when using leaves of different ages from the basic part of the shoots. As the position number of the young leaf on the shoot becomes higher, its repellent effect on polyphages significantly decreases. The change in abundance of young and mature leaves during plant growth caused a seasonal shift in polyphages/oligophages ratio: the maximal occurrence of oligophages usually is shifted to the beginning of the vegetation period, while that of polyphages shifted to the end.
WSiberia; FOLIAGE QUALITY, NUTRITION

99 Baranchikov, Yu.N. 1985.
The gypsy moth in the USA. Lesnoye khozyaystvo. (9):70-72.
-- Data on the history of gypsy moth introduction and dispersal in the USA are given. The species was accidentally introduced into the country in 1869; the first outbreak was recorded in 1889. During the 1980s, the total forest area infested by the gypsy moth amounted to more than 13 million acres. Preferred food species of the gypsy moth on the continent are American oaks, which are less resistant to the action of the pest than European oaks. The gypsy moth also intensively attacks apple, alder, different birch species, poplar, willow, and some other plants. Since the time when outbreaks started, there have been three complementary directions in gypsy moth control in the USA: biological methods, including introduction of the most promising parasites from the natural habitats of the pest, application of bacterial and viral preparations, pesticides, and sex pheromones. Complex investigations proved that elimination of the gypsy moth on the continent was impossible and internal the quarantine was lifted. Management and control measures should be taken continuously.
REVIEW

100 Baranchikov, Yu.N. 1986.
Study of feeding and growth in two lepidopterous species - birch consumers with different levels of trophic specialization. Zhurnal evolutsionnoy biokhimii i fiziologii. 22(6):584-586.
-- Feeding and growth parameters of late instars of *Lymantria dispar* (a broad polyphage) and Endromis versicolora (a narrow polyphage) were determined when larvae were reared on mature leaves of *Betula pendula*. In the latter species, utilization of food consumed had a more pronounced effect on body tissue growth due to a higher consumption rate. Gypsy moth larvae consume more food, thus compensating for lower efficiency of digestion. As a result, its growth rate is as high as that of *Endromis versicolora*.
WSiberia; BEHAVIOR, ENERGETICS, FEEDING, REARING

101 Baranchikov, Yu.N. 1986.
The role of trophic specialization in feeding efficiency of lepidopterous larvae. Avtoreferat disertatsii kandidata biologicheskikh nauk. Institute of Forest and Wood, Siberian Branch, USSR Academy of Sciences, Krasnoyarsk. 24 p.
WSiberia; ENERGETICS, FEEDING, HOST PLANTS

102 Baranchikov, Yu.N. 1986.
Trophic specialization and efficiency of feeding on leaves of rosaceous shrubs by larvae of two Lepidopterous species. Zoologicheskiy zhurnal. 65:361-368.
WSiberia; ENERGETICS

103 Baranchikov, Yu.N. 1987.
Trophic specialization in lepidopterans. (Trophicheskaya spetsializatsiya cheshuekrylykh.) Instutut Lesa i Drevesiny SO AN SSSR, Krasnoyarsk. 171 p.
-- This monograph discusses experimental studies on the trophic specialization of phytophagous lepidopterous insects. The gypsy moth serves as a standard polytrophic species. Specialized and non-specialized lepidopterans are shown to achieve the optimum growth rate in different ways: quantitative, as a result of increased consumption for polyphages, and qualitative, as a result of effective food utilization for oligophages and monophages. To transfer a unit of energy to the second trophic level, the gypsy moth population (polyphagous) expends more energy than any oligotrophic consumer population. This great expenditure of energy by the gypsy moth is compensated for by flexible behavioral adaptations of the insect determined by the processes of learning and forming of temporary relationships. Asian gypsy moth populations are more polytrophic than European ones, which is due to the increased migratory ability of the species in the eastern part of the area and adaptation to unpredictable environmental conditions.
WSiberia; ENERGETICS, FEEDING, GEOGRAPHIC VARIATION, NUTRITION

104 Baranchikov, Yu.N. 1987.
Energy flow in the habitats of oligo- and polytrophic Lepidoptera - pests of trees. In: Ecologicheskaya otsenka mestoobitaniy lesnykh zhivotnykh. Nauka, Novosibirsk: 40-50.
-- Energetics of polyphagous late instar gypsy moth and oligophages on conifers such as the Siberian moth (*Dendrolimus superans sibiricus*) were compared in the laboratory and in nature. There were significant differences between the two species in the efficiency of utilization of detached needles of larch (*Larix sibirica*). In gypsy moth, 10% of detached needle biomass fell to the ground, 59% formed excrements, 9% were used for larval biomass production, and 22% for metabolism. In the Siberian moth, these figures were 5, 52, 21 and 22, respectively. A brief review of the literature revealed the same tendency when comparing the number of leaf-eating lepidopterans with the more specialized needle-eating ones.
WSiberia; ENERGETICS, FEEDING

105 Baranchikov, Yu.N. 1988.
The gypsy moth: results and prospects of investigations. (Neparnyy shelkopryad: itogi i perspektivy issledovaniy.) Institut Lesa i Drevesiny SO AN SSSR, Krasnoyarsk. 52 p.
-- Included are 45 abstracts presenting information on results of studies of gypsy moth biology and population ecology in various geographical zones of the USSR.

Methods of pest population monitoring and control are considered. Data on parasitic complexes of the gypsy moth in the forests of the European part of the country also are given.
REVIEW

106 Baranchikov, Yu.N. 1988.
Ecological mechanisms of evolutional strategy in gypsy moth population of Northern Eurasia. In: Neparnyy shelkopryad: itogi i perspectivy issledovaniy. Institut lesa i drevesiny SO AN SSSR, Krasnoyarsk: 6-7.
-- Intraspecies differentiation of the gypsy moth results in formation of ecological races adapted to different habitats and maintaining their independence due to the isolating effect of natural selection. Parapatric divergence is typical both of European and Asian gypsy moth populations, but for the latter it is hindered by high migratory activity of moths and larvae. The study has shown certain differences in the evolution strategy of European and Asian pest populations. Their comparative studies can provide a basis for finding out the role of ecological mechanisms in evolutionary transformations of phyllophagous insect populations.
ESiberia, ESiberia, Far East; GENETICS, GEOGRAPHIC VARIATION, REARING

107 Baranchikov, Yu.N., Doinenko, O.A. 1981.
Diurnal rhythm of feeding in gypsy moth larvae. In: Biologicheskiye aspecty izucheniya i ratsional'nogo ispol'zovaniya zhivotnogo i rastitel'nogo mira. Riga: 321-323.
-- Gypsy moth larvae from a Bashkirian population exhibited a rhythmic character of food consumption (bird-cherry leaves) and body biomass increment, with a clearly defined maximum of 10:00 p.m. and a minimum of 6:00 a.m. Food utilization rate and efficiency of the food conversion for biomass growth were found to have a reliable inverse relation; i.e., the more food utilized within a given time period, the smaller the part of the utilized food converted for body biomass. This may mean that larvae have some compensatory mechanism that provides a relative daily stability of growth processes.
EEast; BEHAVIOR, FEEDING, ENERGETICS

108 Baranchikov, Yu.N., Gurov, A.V. 1984.
Strategy of plant consumption by entomo-consortium in forest biocenosis. In: Tezisy dokladov IX s"yezda Vsesoyuznogo entomologicheskogo obshchestva. Naukova Dumka, Kiev: 44.
-- Analysis of distribution dynamics of the phyllophage trophic activity in tree crowns is a fruitful method for establishing functional relations between major trophic levels in a forest biocenosis. While specific interrelations of producers and consumers in any forest community are many and varied, phyllotrophic insects tend to utilize resources stepwise, which suggests that antibiotic factors appear in an injured organ. To avoid them, insects tend to expend energy for the transfer. The phenomenon can be observed as a rigid sequence of the stages by which insects utilize tree leaves independent of the tree species.
ESiberia; FOLIAGE QUALITY

109 Baranchikov, Yu.N., Kravtsov, B.A. 1980.
Morphological analysis of geographic gypsy moth populations by the set of features. In: Kolichestvennyye metody v ecologii zhivotnykh. Nauka, Leningrad: 18-20.
-- An analysis of gypsy moth geographic populations was made on the basis of comparison of indices characterizing relationships of some pairs of uncorrelated parameters of females' forewings. Comparison of populations in pairs by each index produced contradictory results. An attempt was made to compare the samples under study by the set of parameters using Fisher discriminant analysis.
WSiberia; GEOGRAPHIC VARIATION, HOST PLANTS, MORPHOLOGY

110 Baranchikov, Yu.N., Kravtsov, B.A. 1981.
An attempt of morphomethric analysis of geographic gypsy moth populations by the set of features. In: Prostranstvenno-vremennaya structura lesnykh biotsenozov. Nauka, Novosibirsk: 96-112.
-- Ecological and ethological variations of geographical populations of gypsy moth in the temperature zone of the Holarctic region are described. Using multidimensional classification, the authors have shown that the morphological similarity of gypsy moth adults of both sexes in the absolute values and indices of forewing parameters is largely determined by the homogeneity of ecological conditions during preimaginal stages of insect development. In females the wing size and shape have no relation to its functions and are not heritable, unlike other functions.
EEast, WSiberia; FEMALES, FLIGHT, GENETICS, GEOGRAPHIC VARIATION, MORPHOMETRICS

111 Baranchikov, Yu.N., Safonova, L.V., Rizhkova, T.S., Kudashova, F.N. 1991.
Balance of energy and nitrogen in gypsy moth larvae fed on needles of larches, grazed by mining insects. Ekologiya. (6):56-62.
-- Needles of larch (*Larix sibirica*) contain less nitrogen and more phenolics and monoterpenoids after defoliation by mining larvae of larch casebearer (*Coleophora sibiricella*). This decreases the relative growth rate of gypsy moth larvae by decreasing relative rates of plant biomass and nitrogen consumption.
WSiberia; ENERGETICS, FOLIAGE CHEMISTRY, NUTRITION

112 Baranchikov, Yu.N., Vshivkova, T.A. 1979.
Changes in gypsy moth feeding and development after a single DDT application. In: Vliyanie pestitsidov na tayezhnykh zhivotnykh. Institut Lesa i Drevesiny SO AN SSSR, Krasnoyarsk: 66-78.
-- A single treatment of a subletha! dose of DDT to 5th instar gypsy moth significantly reduced the amount of food consumed, the pupal weight, and moth fecundity; the hatching rate did not change compared to the control. Male larvae subjected to the treatment had higher food utilization, while their growth rate decreased, as did the conversion of the ingested food. Differences from the control for female larvae were insignificant.
ESiberia; BIOASSAY, CHEMICAL INSECTICIDES, ENERGETICS, REARING

113 Baranovskiy, P.M., Tinyakov, G.G., Pashovskiy, K.A. 1950.
The gypsy moth - *Porthetria dispar* L. In: Nasekomyye - vrediteli lesov Kazakhstana i mery bor'by s nimi. Izd.AN Kaz.SSR, Alma-Ata: 3-86.
-- Morphology of all life stages is outlined. The flight season of adults is in July-August, and females have low vagility. There are up to 1000 eggs in an egg mass and oviposition occurs at the tree base of various deciduous species. Sometimes eggs are laid on higher parts of the trunk, on stumps, in the litter, on the ground, on stones, etc., with pupation occurring in June. In Kazakhstan, deciduous species (except ash) and conifers are attacked. Oak, linden, maple, bastard acacia, elms, poplar, birch, willow, aspen, larch, pine, and fruit-bearing trees are most often defoliated. A single defoliation results in the loss of growth and no nut crop for a period of 2 years. Multiple defoliation causes weakening, infestation by secondary pests, and death of the tree. Control measures include aerial chemical treatment in late April- May, oiling and collecting of egg masses, as well as applying sticky bands, and activity of insectivorous birds. The level of disease incidence and parasitism should be taken into account; if 50% of the larvae are infected or parasitized no chemical treatment is needed.
MAsia; BIRDS, CONTROL, HOST PLANTS, LIFE STAGE DESCRIPTIONS, OVIPOSITION SITE, TREE GROWTH

114 Bardges, G.D., Hassi, N.U. 1976.
Microorganisms in the control of pest insects and mites. (Microorganizmy v bor'be s vrednymi nasekomymi i kleshchami.) Kolos, Moscow. 546 p.
-- Russian translation of the book on the use of microorganisms in many countries of the world for protecting plants against insects, including the gypsy moth.
MICROBIAL PESTICIDES, PEST LIST, REVIEW

115 Barteneva, Ye.V., Gostjunin, I.V., Persidskaya, L.T. 1974.
Effect of temperature on the feeding rate of gypsy moth larvae. In: Nauchnyye trudy Moskovskogo lesotekhnicheskogo instituta. Voprosy zashchity lesa. MLTI, Moskva: 93-96.
-- To establish dates for forest stand treatment determined by weather conditions, optimum temperatures at which gypsy moth larvae fed most actively were tested in the laboratory. Second instars were studied in a climatic chamber and oak seedlings were used as a food plant. As a result, gypsy moth larvae were found to start feeding at a temperature of about 10° C. They fed intensively and their weight increased at temperatures ranging from 15°C to 28°C. Maximum food consumption was observed at a temperature of 27°-28°C. Any treatment with intestine preparations should be made at a mean day temperature of 15°C and higher. At lower temperatures and rainy weather, treatment efficacy decreased.
ECentral; BEHAVIOR, FEEDING, TEMPERATURE

116 Barybkina, M.N. 1979.
Morphological and functional basis of response to sex attractants with special reference to *Lymantria dispar* males. Avtoreferat dissertatsii kandidata biologicheskikh nauk. Moscow. 22 p.
-- The mechanisms of gypsy moth response to pheromone and signal transmission path in the organism were studied. Numerous trichoid and basiconic sensillas of antennae were found to be the morphological basis for odor reception. They are highly selective, but some of them respond to disparlure, while others respond to similar compounds. After the primary analysis of the stimulus, the signal goes to the olfactory lobe of the brain where there are two types of neurons. One type responds to disparlure only, the other responds to both disparlure and similar compounds. In the first system of gypsy moth males, two independent irritation transmission paths were found; a specific tract and a non-specific tract, which also had a different response to disparlure and its analogues. Locomotor response of males to the sex attractant differs from other odor stimuli as a result of differentiation of stimuli in the brain; it appears to be a mechanism of recognition of insects belonging to the same species.
ECentral; PHEROMONES, PHYSIOLOGY

117 Barybkina, M.N. 1980.
Ability of gypsy moth males to distinguish structurally similar compounds. In: Khemoretseptsiya nasekomykh. Vilnius: 99-107.
-- The ability to distinguish between odoriferous substances similar in their composition was investigated by studying selectivity of sensitive cells of sensillas and neurons of the brain olfactory lobe. Two types of receptor cells of different selectivity were found in trichoid sensillas on male antennae. There are "A" receptors responding to disparlure concentrations lower than those of its homologues, and "B" receptors similarly responding to the synthetic sex pheromone and structurally similar substances. Due to these specific receptor cells, the insect can differentiate the smell of the sex pheromone from other smells in its environment. After the primary analysis of chemical stimuli, the signal is transferred in impulses by sensitive cells to the central parts of the olfactory analyzer where further selection of useful information is made.
ECentral; NEUROLOGY, PHEROMONES, PHYSIOLOGY

118 Barybkina, M.N. 1988.
Basis of sex pheromone perception and ways of sensory information transformation in the nervous system of lepidopterans. In: Referaty 4-go Vsesoyuznogo simpoziuma po khemoretseptsii nasekomykh. Vil'njus: 11.
-- Gypsy moth males were used as an example to show that the primary analysis of odor stimuli is made in the periphery of the olfactory analyzer by the cells specific to sex pheromone. The information transferred from these receptors is subject to further analysis in interneurons of the deutocerebrum, which are capable of differentiating the sex pheromone from compounds similar in composition. A stereotype wing flutter response is started as a result of activation of special neurons generating the rhythm of the pterothoracic ganglion under the impact of signals from the specific neurons of deutocerebrum, which were, in turn, irritated by specific receptor cells.
ECentral; NEUROLOGY, PHEROMONES

119 Barybkina, M.N. 1988.
Morphological and functional principles of response to sex pheromone by gypsy moth males. In: Nepamyy shelkopryad: itogi i herspectivy issledovaniy. Institut lesa i drevesiny SO AN SSSR, Krasnoyarsk: 45.
-- Over 86% of all sensillae of gypsy moth antennae were found to have receptors of selective response to the sex pheromone odor. After the pheromone is perceived by peripheral nerve cells, axons of these cells transfer nervous impulses, without synaptic switching, to the olfactory lobe of the deutocerebrum where the final analysis of odor stimuli is made. It was shown experimentally that there are neurons in the deutocerebrum selectively responding to the sex pheromone. These neurons are more selective than olfactory receptors, which is exhibited in the ability of deutocerebrum cells to differentiate the smell of disparlure from structurallly similarl substances. By registering the impulse activity of pterothoracic ganglion interneurons, cells were found that transfer the signals from receptors to motor organs. A locomotor response is started by activating special neurons generating the rhythm under the impact of the brain olfactory lobe neurons activated by especially sensitive cells of the sensillae. Depending on the ways by which activation from receptors is transferred to motor organs, different behavioral responses of the insects to the action of an odor stimulus can be formed. The response of wing muscles to the sex pheromone is characterized by the uniformity of muscle potentials, which is the basis for forming a stereotype response, wing flutter. The author believes this system of perceiving sex pheromones is one of the most perfect detecting systems in the insect nervous system.
ECentral; MORPHOLOGY, NEUROLOGY, PHEROMONES

120 Basov, V.M. 1979.
The gypsy moth. Zashchita rasteniy. (7):59.
-- Data on food plants of the gypsy moth are outlined and a list of major food species is given. It is noted that the pest attacks more than 300 species. All life stages and general data on the species ecology are given. The gypsy moth prefers dry, light, well heated stands, mainly second growth or 20-year-old plants. General data on vertebrate enemies are given and it also is mentioned that more than 150 species of entomophages of the gypsy moth are known. General data on pest control also is included.
ECentral; STAND COMPOSITION

121 Batiaschvili, L.X., Bagdavadze, A.X. 1941.
The pest entomofauna of fruit gardens in eastern Georgia (Cartaliniya and Meskhetiya). In: Izvestiya Gruzinskoy STLZR, ser. B, Entomologiya. Tbilisi: 23-26.
-- Gypsy moth is one of the pests of gardens in eastern Georgia
Caucasus; PEST LIST

122 Bednyy, V.D. 1978.
Sticky attractive traps. Zashchita rasteniy. (12):27-29.
-- Disparlure-baited folding traps are suggested for forecasting gypsy moth populations. The work was done in Moldavia and in the Ukraine where only males were attracted. A capture of 1,000 gypsy moth males per trap is considered critical.
EWest; PHEROMONE TRAPS

123 Bednyy, V.D. 1979.
Assessment of attractive insecticidal traps for capture of the gypsy moth and the nun moth. In: Prostranstvennaya orientatsiya nasekomykh i kleshchey. Izdatel'stvo Tomskogo universiteta, Tomsk: 3-10.
-- Data on the question under study are discussed. Pheromone traps used for catching gypsy moths and nun moths are described. Advantages of attractant-insecticide traps compared to sticky traps are shown.
EWest; PHEROMONE TRAPS

124 Bednyy, V.D. 1979.
Results of disparlure application for control of gypsy moth. In: Biologicheski aktivnyye veshchestva v zashchite rasteniy. Moscow: 52-56.
-- Possibilities of gypsy moth control by "male vacuum" and disorientation methods are discussed. The "male vacuum" method is regarded as unsuitable. Forest treatment with disparlure at a rate of 1-25/ha sharply decreases male attraction to pheromone traps but pest population decrease was only observed in some experiments.
EWest; MATING DISRUPTION

125 Bednyy, V.D. 1981.
Disorientation of gypsy moth males with an optically active disparlure. In: Nadzor za vreditelyami i boleznyami lesa i sovershenstvovaniye mer bor'by s nimi. Tezisy dokladov. VNIILM, Moscow: 23-24.
-- The fact that racemic disparlure did not appear to be effective enough for gypsy moth control in the experiments forces researchers to continue studying optically active disparlure. The experiments were carried out in an open-air cage with tree seedlings. The cage had an area of 60 sq m and a height of 2 m. A similar cage not treated with disparlure was used as a control. Under experimental conditions, mating was not observed during the 2 days after treatment. While the flight of males was sometimes active though not energetic, they did not approach females. After oviposition, 5 egg masses from the control and 5 from the experiment were analyzed. The rate of sterile eggs was 2.2% in the control and 100% in the experiment. Experimental egg masses were 3 times smaller in size than the controls (357 vs 1009 mm). The results of the experiment allow us to state that sex disorientation of gypsy moth males with optically active disparlure is possible.
EWest; MATING DISRUPTION

126 Bednyy, V.D. 1984.
Technology of disparlure application in forest protection. (Tekhnologiya primeneniya disparlula v zashchite lesa.) Shtiintsa, Kishinev. 167 p.
-- The methods of disparlure application in European populations of gypsy moth and nun moth are described. Numerous data are given on daily and seasonal activity of moths and their mating behavior.
EWest, ECentral, EEast; MATING, PHEROMONE TRAPS

127 Bednyy, V.D. 1988.
Biological backgrounds for application of gypsy moth pheromone in forest protection. In: Neparnyy shelkopryad: itogi i perspektivy issledovaniy. Institut lesa i drevesiny SO AN SSSR, Krasnoyarsk: 46.
-- Gypsy moth control using pheromone traps is based on the dependence of the number of egg masses to the number of moths caught. This is determined by the population density and weather conditions in the flight season of adults. Just as important are other population and environmental parameters such as the level of perception by males of the synthetic pheromone. The author found gypsy moth populations in Moldavia to have significant differences in this parameter depending on the stage of their gradation. Enhanced response to the synthetic pheromone is typical of latent (sparse) pest populations. Different levels of male responses to synthetic pheromone were observed among gypsy moth populations with usual population dynamics at a depression stage of various levels. The ability of females to attract males also is different in different populations. It is concluded that criteria of forest pathology stand estimation using pheromone traps must be regional and must take into account the state of gypsy moth populations.
EWest; PHEROMONE TRAPS, BEHAVIOR

128 Bednyy, V.D. 1989.
Causes of unsatisfactory results of sexual disorientation of the gypsy moth (*Lymantria dispar* L., Lepidoptera, Lymantriidae) with disparlure. In: Biologicheskaya integrirovannaya bor'ba s vreditelyami v lesnykh biotsenozakh. Materialy simpoziuma. VPS MOBB, Moscow: 8-13.
EWest; MATING DISRUPTION

129 Bednyy, V.D., Chernichuk, L.L., Chekanov, M.I., Cherkizova, V.L. 1980.
The influence of preliminary storing of males of the gypsy moth in an atmosphere saturated with disparlure on their mating ability. In: Khemoretseptsiya nasekomykh. Vilnius: 123-125.
-- The lower sexual activity of gypsy moth males under standard conditions after being exposed to air saturated with disparlure for some time showed that this preparation primarily affects the threshold of chemoreceptor sensitivity to the pheromone. Other suggested causes affecting the male's searching ability such as closer orientation, camouflaging of a directional flow of the female pheromone, or physiological exhaustion, could be ignored.
Ewest; BEHAVIOR, PHEROMONES

130 Bednyy, V.D., Khazanov, Yu. L., Mirzoyan, S.A., Platunov, B.I., Anikina, Z.L. 1979.
Attractant traps for gypsy moth. In: Novyye metody v zashchite rasteniy. Shtiintsa, Kishinev: 3-12.
-- Three-cornered attractant-insecticide traps with 19.5 g of fumigating insecticide plates equivalent to 3.6 DDVP caught the same number of gypsy moths as attractant sticky traps. For the nun moth, attractant-insecticide traps are not practical since the adults of this species are reluctant to fly into closed traps.
EWest; PHEROMONE TRAPS

131 Bednyy, V.D., Kondorskiy, B.M. 1987.
Updating forest entomological monitoring by means of pheromone traps. In: Novyye metody v zashchite rasteniy. Shtiintsa, Kishinev: 25-31.
-- The gypsy moth is used as an example to show possible ways of perfecting pathological investigation of forest stands using pheromone traps to forecast insect population levels and the necessity for their control. Trapped moth data need to be corrected by taking into account the abiotic and biotic factors influencing them. Special attention is paid to the level of pheromone perceived by moths from the environment. Ecological and geographical gypsy moth populations are found to differ considerably in this parameter.
EWest; PHEROMONE TRAPS, PROGNOSIS

132 Bednyy, V.D., Kondorskiy, B.M. 1988.
Effect of composition of oak groves on gypsy moth larvae captured with pheromone traps. In: Referaty 4 Vsesoyuznogo simpoziuma po khemoretseptsii nasekomykh. Vilnius: 46.
-- The comparison of the numbers of males caught in traps showed English oak and pubescent oak stands to be an order of magnitude more infected than stands of durmast oak mixed with some other species. The population in durmast oak stands is at an innocuous level and it is not practical to use traps there. The proportion of durmast oak in oak groves can be the main parameter for determining entomological resistance of stands to the gypsy moth.
EWest; PHEROMONE TRAPS, STAND COMPOSITION

133 Bednyy, V.D., Kovalev, B.G. 1978.
Basis for the use of disparlure for determination and prediction of numbers of the gypsy moth. In: Khemoretseptsiya nasekomykh. Vilnius: 147-151.
-- Experiments carried out in 1973-1975 in 50-year-old thinned oak stands in the Yedinets Forest of Moldavia showed a direct dependence of the number of gypsy moth males caught to the numbers of a new generation of this pest in prodromic populations. Eruptive populations had no such dependence. Data on ways to place traps used to forecast the pest population level are presented. The optimum dose of disparlure per trap was determined to be 5 mkg. When this dose is increased to 1 mg, traps do not become more effective. The attractive power of disparlure traps is much lower than the attractancy of females.
EWest; PHEROMONE TRAPS, PROGNOSIS

134 Bednyy, V.D., Kovalev, B.G., Chekanov, M.I. 1977.
Use of disparlure for estimation and prognosis of population density in the gypsy moth *Porthetria dispar* L. Zoologicheskiy zhurnal. (11):1719-1724.
EWest; PHEROMONE TRAPS

135 Bednyy, V.D., Kovalev, B.G., Chekanov M.I. 1976.
Disparlure application. In: Ispol'zovaniye khimicheskikh i biologicheskikh sredstv v bor'be s vreditelyami lesa. VNIILM, Moscow: 11-12.
-- The optimum attractant dose was found to be 5 mkg per trap when applied to filter paper. Females were 2-4 times more attractive than synthetic disparlure. Direct

dependence of the number of males caught to gypsy moth population density allows disparlure traps to be used to assess and forecast gypsy moth population numbers. Their application is of practical importance when the population increases. To forecast gypsy moth population dynamics with the traps, the ratio of the number of males caught to the number of egg masses laid by females is determined. Peaks and recessions of active flight correlate with microclimatic parameters. Different populations are observed to have peculiar flight dynamics; i.e., the flight starts and finishes earlier in an eruption phase. For a reliable population count, attractant traps should be placed in the corners of a square of 1.1 km. Differences were observed when traps were placed at different heights. In depressive populations 2 to 3 times more males were caught at a height of 0.3 m than at 1.5 to 3 m. When the population level was high male catches at heights ranging from 0.3 to 3 m were the same. This can be accounted for by an even distribution of females along the tree in an outbreak phase. Belts were the most effective traps due to the behavior of males to fly around the trunk searching for females.
EWest; PHEROMONE TRAPS, PROGNOSIS

136 Bednyy, V.D., Platunov, B.I., Florinsky, A.N., Anikina, Z.L. 1980.
The use of pheromone traps for gypsy moth control in mountain forests of the Crimea. In: Novyye metody v zashchite rasteniy. Shtiintsa, Kishinev: 33-36.
-- Traps were found to give more reliable data on the pest population than a conventional method of counting egg masses
EWest; EGG MASSES, PHEROMONE TRAPS, SAMPLING

137 Bednyy, V.D., Tuganov, S.R., Anishchenko, B.I., Torchik, M.V. 1981.
Attractive capacity of disparlure and its analogue to the nun moth (*Porthetria monacha*). Zoologicheskiy zhurnal. 60(7):1024-1029.
-- The minimum quantity of disparlure necessary for attracting nun moth males to the traps is 50 mkg. The attractancy of nun moth females is variable: in some populations it is below the optimum dose of disparlure and higher in other populations.
EWest; PHEROMONES

138 Bednyy, V.D., Zhunku D.S. 1979.
The role of vision in mating behavior of gypsy moth males. In: Prostranstvennaya orientatsiya nasekomykh i kleshchey. Izdatel'stvo Tomskogo Universiteta, Tomsk: 11-15.
-- This is a review of literature on the role of vision of gypsy moth males in interspecies mating. Experiments showed that it was an olfactory response rather than a visual response that enabled a flying male to find the source of sex pheromone and land there. The possibility of gypsy moth control by the sex disorientation method is discussed.
EWest; MATING, PHEROMONE TRAPS, REVIEW

139 Bei-Bienko, G.Y. 1924.
Materials on gypsy moth biology in Altai Territory. In: Trudy Omskoy sel'skokhozyaystvennoy akademii. Omsk: 155-160.
WSiberia; FEMALES, FLIGHT, GENERAL BIOLOGY

140 Bekker, A. 1885.
A report on natural history for the year 1854 (in German). [Einige naturhistorische Mitteilungen von den Jahre 1854.] Byulleten' Moskovskogo obshchestva ispytatelei prirody. 2:460-481.
-- The author studied the Lepidoptera fauna in the Middle and Lower Reaches of the Volga River. A list of 403 lepidopterous species is given. The gypsy moth is mentioned as a common species in stands.
ECentral; FAUNAL LIST

141 Belanovskiy, I.D. 1929.
Insect pests at the Boyarsk research forest in summer 1927. In: Zapiski Kievskogo sel'skokhozyaystvennogo instituta. Kiev: 51-68.
-- As a result of pest outbreaks in the summer of 1927, the gypsy moth and other phyllophages (browntail moth, tent caterpillar) heavily injured hardwood species. Larvae and pupae were heavily parasitized by ichneumons and egg masses were destroyed by the dermestids *Dermestes lardarius* Hl., and *Attagenus piceus* Oliv. By the end of the larval stage, polyhedrosis infection was observed. In the first instar, larvae were heavily attacked by *Apanteles fulvipes* Hl. Larvae also were attacked by *Calosoma* sp., and burying beetle larvae. *Anthrax morio* L. was numerous and the author regards it as an important parasite.
EWest; PARASITES, PREDATORS

142 Belik, I.I. 1970.
Lepidopterous fauna in artificial plantations of Voroshilovograd Region and determination of its peculiarities. Avtoreferat dissertatsii kandidata biologicheskikh nauk. Voroshilovograd. 17 p.
-- The gypsy moth is mentioned along with other serious pests of artificial stands consisting mainly of oak. Outbreaks occur and there are stable foci together with other pests: browntail moth, winter geometrid, tent caterpillar. The author believes that this is all due to unfavorable conditions for stand growth in Voroshilovgrad Province.
ECentral; FAUNAL LIST, STAND CONDITION

143 Belizin, A.P. 1946.
The gypsy moth and its control in Tadzhikistan. In: Narodnyyi komitet zemledeliya Tadzhikskoy SSR. Stalinabad: 3-7.
-- The gypsy moth is one of the most widespread pests of fruit and nut plants as well as of hardwood forests in the foothills and mountains of Tadzhikistan. Gypsy moth life stages, biology and control measures such as treatment with petroleum, collection of egg masses, collection of larvae, sticky belts, and chemical treatment are described.
MAsia; CONTROL

144 Belizin, A.P. 1948.
Insect pests of subtropical crops in Middle Asia. First report. In: Trudy Kirgizskogo sel'skokhozyaystvennogo

instituta. Frunze: 3-38.
-- The gypsy moth is a pest of walnut and pistachio. In 1930-1935, it attacked plants of both species in large mountain forest areas.
MAsia; HOST PLANTS, PEST LIST

145 Belizin, A.P. 1948.
The gypsy moth and its control. In: Vrediteli plodovykh sadov Kirgizii. Frunze: 3-8.
-- The gypsy moth is one of the most important pests of fruit and nut plants, and hardwood forests of Kirgizia. Apple, pear, quince, plum, and apricot are the most heavily attacked orchards. Pest life stages, and biology and control measures are described. Control measures include treatment with petroleum and collection of egg masses, application of sticky belts, autumn treatment of trees with 5% mineral oil emulsion, and spraying of trees with Paris green and DDT when larvae are feeding.
MAsia; CHEMICAL INSECTICIDES, CONTROL, HOST PLANTS

146 Belov, A.N. 1976.
Determination of criteria for gypsy moth control. In: Ispol'zovaniye khimicheskikh i biologicheskikh sredstv v bor'be s vreditelyami lesa. VNIILM, Pushkino: 13-15.
-- Spatial distribution was studied in oak groves of Penza Province in 1974-1975. Actual distribution of gypsy moth egg masses was found to agree with the negative binomial model, both at high and low population density levels. Mathematical regularities of relations between distribution parameters were established. As yet, there is no common opinion on the critical densities of gypsy moth populations. According to data from different authors, 4 to 25 egg masses per tree can cause complete defoliation. In the USA, a density level of 500 egg masses/acre (1.7-1.8 egg masses/tree) is a criterion for taking eradication measures. Less than 300 egg masses/acre (about 1 egg mass/tree) is regarded as an innocuous density. A table is included allowing conclusions to be made as to the density level of a specific population. Limiting values of the number of egg masses per certain number of trees, from 5 to 100, also are given. The table can assist in estimating the pest population density level as high or low. This method can reduce labor costs by 40-70%, while the probability of exact estimation of the density level is 95%.
ECentral; EGG MASSES, MODELS, NUMERICAL DATA, PROGNOSIS, SAMPLING

147 Belov, A.N. 1977.
The sample size, i.e., the number of trees, in counting population of insect pests. Lesnoye khozyaystvo. (1):76-78.
-- Penza Province was surveyed. At all levels of pest population, the sample corresponded to the negative binomial model.
ECentral; MODELS, SAMPLING

148 Belov, A.N. 1977.
Assessment of gypsy moth abundance by sequential sampling. In: Voprosy lesovodstva i lesozashchity. VNIILM, Pushkino: 71-75.
-- In forest protection it is not uncommon that exact estimation of a pest population is not needed. For instance, in determining if control measures are necessary, it is sufficient to find out if the population density is higher than a certain level. In this case, the sequential sampling method can be a time saver. In applying the method to the gypsy moth, the results of studying the spatial distribution of its egg masses in middle-aged oak shrubwood were used. These data, together with literature data on the degree of stand defoliation and the aim of control measures, allowed simple equations to be derived which can be used to work out the plan of sequential gypsy moth counts at any critical population level. There is an example of such a count, when complete defoliation could be caused by a population density which is more than 5 egg masses per tree. The sequential sampling method allows 1.5 to 2 times the reduction of labor and time expenditures on counts and ensures 95% probability of exact population level estimation.
ECentral; EGG MASSES, PROGNOSIS, SAMPLING

149 Belov, A.N. 1978.
Sample size when counting the gypsy moth egg masses in oak groves. Lesovedenie. (3):77-83.
-- Data on gypsy moth egg numerical counts in oak groves of Penza Province are analyzed. Actual egg mass distribution corresponds with the negative binomial model at high and low population density levels. At a low population density, egg masses are more aggregated as the role of interference is insignificant. However, the aggregation rate also is high in an outbreak phase. Mathematical regularities of relations between distribution parameters are found. Empirical formulae are suggested to calculate the necessary sample size and to count errors. Tables to find the sample size without calculations are given.
ECentral; EGG MASSES, MODELS, NUMERICAL DATA, SAMPLING

150 Belov, A.N. 1978.
Sequential sampling method of the gypsy moth. Lesnoye khozyaystvo. (4):88-90.
-- A plan of sequential count is presented in a table which gives the number of egg masses expected at high and low pest population levels. The method allows 1.5-2 times the reduction in the volume of counting work.
ECentral; EGG MASSES, MODELS, NUMERICAL DATA, SAMPLING

151 Belov, A.N. 1979.
Sampling gypsy moth egg masses on young growth and undegrowth. In: Itogi i perspectivy nauchnykh issledovaniy v oblasti lesnogo khozyaystva. VNIILM, Pushkino: 63-66.
-- Possibilities of counting using an indirect regression technique on the basis of the number of egg masses on trees are discussed. In a direct count in oak groves where oak density is more than 0.5, the most convenient elementary counting unit is the area of the crown projection of the tree under count and half the distance between crowns of neighboring trees if the crowns are not in contact. The sample size is established by the count plans suggested earlier to estimate the number of egg masses on the trees. When the counts are made in

thinned oak groves in areas with thick young growth and undergrowth, the count in plots with an area of 2.2-2.5 sq m is more suitable. If undergrowth is thin the plots should be of an area of 10-15 sq m.
ECentral; EGG MASSES, MODELS, SAMPLING

152 Belov, A.N. 1979.
Optimizing the frass trap method of estimating gypsy moth numbers. In: Itogi i perspectivy nauchnykh issledovaniy v oblasti lesnogo khozyaystva. Moscow: 59-62.
-- Using optimum count units minimizes the amount of count work and provides the required exactness for population estimates. The optimum size of excreta traps used in gypsy moth population counts was calculated based on data of larval distribution regularities in the stand and as a result of motion and time studies. If wooden excreta traps are used, the optimum area of one box is 0.0368 sq m; if excreta traps are made of polyethylene film, the area must be 0.055 to 0.075 sq m. The number of counts needed in the plots with a density of 0.7 and higher, with 10% error, ranged from 30-35 at a density of 100 larvae per tree, to 20 at a density of 400 larvae per tree.
LARVAE, NUMERICAL DATA, SAMPLING

153 Belov, A.N. 1980.
Microstatial pattern of distribution of the gypsy moth egg masses. In: Zashchita lesa ot vrediteley i bolezney. Moscow: 40-47.
-- Peculiarities of gypsy moth oviposition in middle-aged shrubwoods in Penza and Saratov Provinces are discussed. Infestation of trees with egg masses was found to be determined by the trunk shape and diameter, tree species, shrubs near the tree and their density. In mixed oak-linden and oak-aspen stands, tree infestation with egg masses is determined by the proportion of the given species in the stand composition.
ECentral; EGG MASSES, OVIPOSITION SITE, SAMPLING, STAND COMPOSITION

154 Belov, A.N. 1981.
Some peculiarities of oak damage by the gypsy moth larvae. In: Rol' nauki v sozdanii lesov budushchego. Tezisy dokladov Vsesoyuznoy konferentsii, Pushkino. Leningrad: 154-155.
-- Leaf injuries caused by gypsy moth larvae decrease from the base to the top of the leading shoot. Incidence of injured leaves is positively related to the leaf blade area, but the proportion of the part consumed is inversely related to the whole leaf blade area. The number of leaves in a bunch on the shoot is inversely related to the injury rate of leaves in the bunch.
ECentral; BEHAVIOR, DEFOLIATION, FEEDING, NUMERICAL DATA

155 Belov, A.N. 1982.
Diurnal rhythm of the gypsy moth larval activity on oak trees in the southeastern part of the RSFSR. In: Molodyye uchenyye v sovershenstvovanii teorii i practiki vedeniya lesnogo khozyaystva. Trudy nauchnoy konferentsii aspirantov i nauchnykh sotrudnikov VNII lesovodstva i mekhanizatsii lesnogo khozyaystva, Pushkino,1982. VNIILM, Pushkino: 135-138.
-- Peculiarities of a larval diel rhythm of feeding and migration in Saratov and Penza Provinces in 1974-1980 are discussed. Nocturnal feeding is common for larvae, but at high population density they start feeding around the clock. Larval migrations connected with diel activity rhythm tend to become longer as larvae grow. The local population is essentially different from populations in other regions where similar studies were made (Ukraine, North America) in that only few larvae (on the average, about 10%) migrate and migrations occur within the tree. When the studies were made, larvae did not move down to the litter regularly. Due to peculiarities of the diel rhythm of gypsy moth, numerical counts in the Southeast under standard conditions can be reduced to tree crowns and trunks, ignoring the litter.
ECentral; BEHAVIOR, DISPERSAL, GEOGRAPHIC VARIATION, LARVAE

156 Belov, A.N. 1983.
Time and space distribution of the gypsy moth on oak trees of the southeastern European part of the RSFSR. Avtoreferat dissertatsii kandidata biologicheskikh nauk. Moscow. 22 p.
-- Peculiarities of spatial-temporal distribution of gypsy moth were studied in Saratov and Penza Provinces in 1974-1982. A model is suggested for changes in the pest population dynamics determined by the population state during an outbreak. Regression equations are given for a short-term forecast of gypsy moth population dynamics.
ECentral; EGG MASSES, MODELS, POPULATION DYNAMICS, PROGNOSIS, SAMPLING

157 Belov, A.N. 1984.
Nomogram for determining increment losses in trees in *Lymantria dispar* L. foci. Lesnoye khozyaystvo. (12):50-51.
-- The nomogram allows an estimate of the wood increment losses in gypsy moth foci not only in terms of defoliation, but also with regard to stand condition, weather in the vegetative season, and other factors affecting tree growth.
ECentral; DEFOLIATION, STAND CONDITION, TREE GROWTH

158 Belov, A.N. 1984.
The use of a spatial distribution model of a population for forecasting number dynamics in abundant insect species. In: Lesnyye ekosistemy i voprosy modelirovaniya. Moscow: 20-26.
-- Variability of parameters of the gypsy moth distribution model is traced in oak groves of Saratov Province in connection with changes in the population qualitative composition during an outbreak. A regression equation is given for a short-term forecast of gypsy moth population.
ECentral; MODELS, POPULATION QUALITY, PROGNOSIS

159 Belov, A.N. 1985.
Sampling gypsy moth larvae in oak groves. Lesnoye khozyaystvo. (3):55-57.
-- A simplified method of larval counts based on the regularities of insect vertical distribution in tree crowns in

middle-aged oak shrubwoods is suggested.
ECentral; LARVAE, SAMPLING

160 Belov, A.N. 1985.
Vertical distribution of gypsy moth larvae on oak southeast of Europe. Izvestiya sel'skokhozyaystvennoy akademii. (3):143-148.
-- The author used an integrated parameter, comparing the proportion of larvae living in the lower crown area to their total number to develop a technique of inventory using only branches from the lower crown.
ECentral; LARVAE, MODELS, SAMPLING

161 Belov, A.N. 1985.
Effect of gypsy moth outbreaks on oak groves. Izvestiya Timiryazevskoy sel'skokhozyaistvennoy akademii. 6:183-185.
-- Investigations carried out in 1976-1982 in middle-aged oak shrubwoods of Saratov Province showed that leaf injuries caused by insects only led to death of trees in the most weakened stands. The proportion of dead trees was 2.9% higher than normal natural mortality. When the leaves were injured over 2 years, the first year of defoliation produced the greater effect on the tree's condition. A regression equation is given to characterize the mortality rate of the trees in phyllophagous insect foci in connection with the initial condition of oak groves and vigor and quickness of leaf consumption by insects.
ECentral; DEFOLIATION, MODELS, TREE HEALTH

162 Belov, A.N. 1986.
Effect of insect defoliators on oak growth. Lesnoye khozyaystvo. (4):67-69.
-- The northern part of the Saratov Province was surveyed. A regression equation of tree diameter increment in the foci of phyllophagous pests is suggested.
ECentral; DEFOLIATION, MODELS, TREE GROWTH

163 Belov, A.N. 1987.
Survey of gypsy moth abundance in large forest stands. Lesnoye khozyaystvo. (10):58-60.
-- Results of studying gypsy moth spatial distribution in middle-aged oak shrubwoods in Penza and Saratov Provinces are presented. A mathematically optimized plan of pest population count is suggested and a numerical forecast based on egg mass distribution is made. It is concluded that during an outbreak it is advisable to examine as many tree plots as possible, but the number of trees under count should be comparatively small. In the phases of depression, increase and crisis, the number of plots examined can be reduced and the sample size should be increased in every plot recognized as the primary pest focus. The count plan can be used to develop the optimum way to estimate gypsy moth populations in large forest areas taking into account specific conditions, time, and place.
ECentral; EGG MASSES, MODELS, PROGNOSIS, SAMPLING

164 Belov, A.N., Panina, N.B. 1983.
Impact of forest and ecological conditions on gypsy moth distribution. In: Progr. lesa i voprosy okhrany prirody. Moscow: 79-87.
-- Gypsy moth egg masses are more evenly distributed among individual trees under the closed canopy of highly productive stands due to less diverse ecological conditions than in medium or low density stands. Qualitative characteristics of these differences are given on the basis of studies made in oak stands of Saratov Province. Plans are made for sequential counts of gypsy moth populations with different required exactness of data.
ECentral; EGG MASSES, SAMPLING, STAND COMPOSITION

165 Belov, A.N., Panina, N.B. 1985.
Diurnal rhythm of gypsy moth larval activity in the South Krasnoyarsk Territory. Izvestiya Timiryazevskoy sel'skokhozyaistvennoy akademii. (1):132-139.
-- The results of observations of gypsy moth larval behavior in orchards of Krasnoyarsk Krai are analyzed. Larvae fed at night and rested during the day. In the morning, larvae were observed to move from leaves to "resting" places. The number of migrating larvae and the distance to "resting" places are proportional to the number and quality of these places. The use of artificial shelters to count larvae is considered.
WSiberia; BEHAVIOR, LARVAE, SAMPLING

166 Belov, A.N., Panina, N.B. 1985.
Spatial distribution of gypsy moth and its entomophages at population density fluctuations. Izvestiya Timiryazevskoy sel'skokhozyaistvennoy akademii. (2):112-119.
-- This work was performed in middle-aged oak shrubwoods of the third to fifth quality class in Penza and Saratov Provinces. The analysis of parasite pupae distribution in soil, and gypsy moth egg mass distribution among trees showed that the spatial distribution of these species populations was determined by fluctuations in the average density of the infestation at preferred microstations, and by the absolute number of individuals in them. A classification for aggregation rates is suggested. Suggestions are made for further improvement of methods of studying insect spatial distributions.
ECentral; EGG MASSES, MODELS, PARASITES, POPULATION DYNAMICS, SAMPLING

167 Belova, N.A. 1988.
Gypsy moth population dynamics in the Baikal Preserve. In: Neparnyy shelkopryad: itogi i perspectivy issledovaniy. Institut lesa i drevesiny SO AN SSSR, Krasnoyarsk: 7.
-- Observations were made in 1981-1987 in the Baikal Preserve. Major forest species of the area under study are Siberian pine, fir, birch, poplar, spruce, and aspen; in the undergrowth they are bird-cherry, willow, and subalpine alder. The results were based on light trap data and on visual counts of gypsy moth individuals during the course of the survey. Adults were observed from August 2 to 21. Almost every year, adults are observed flying to a light source. The overwhelming majority of individuals caught in light traps are mature females. Females oviposit on house walls, poles, and in the chinks of outhouses. No significant injury was found in preserve stands during the

observation.
ESiberia; FEMALES, FLIGHT, LIGHT TRAPS, PHENOLOGY

168 Belova, N.K., Nikolaevskaya, N.G. 1988.
Biological features of gypsy moth in stands of the city of Moscow. In: Neparnyy shelkopryad: itogi i perspectivy issledovaniy. Institut lesa i drevesiny SO AN SSSR, Krasnoyarsk: 7-8.
-- A gypsy moth outbreak was observed in Moscow in 1986-1987 and correlated with favorable weather conditions for the pest, droughts in April and June, and frosty winters from 1983-1985. Imago flight was observed July through August. The average potential fecundity was 302.8 eggs; the actual number was 274.2 eggs. Egg masses were mainly found at a height up to 30 cm (98.8%); females preferred southern sides. The relationship between the number of eggs, egg mass size, and weight was established and is described by equations $y = 62.86 + 0.917x$ (1) and $y = 117.9 = 0.989x$ (2) where y is the number of eggs per mass; x (1) is the mass size (mm); and x^2 is the mass weight (g). Hatching starts in early May. Larvae attacked the trees of 16 species, the optimum food plants being oak, apple, and birch. For the first time, larvae were observed feeding on thuya and blue spruce
ECentral; EGG MASSES, MODELS, NUMERICAL DATA, PHENOLOGY

169 Benkevich, V.I. 1939.
Gypsy moth ecology. In: Tezisy dokladov konferentsii molodykh uchenykh posvyashchennoy 18 s"yezdu VKP(b). Akademiya sel'skokhozayistvennogo instituta im. K.A.Timiryaz'eva, Moscow: 2.
-- Data on the peculiarities of gypsy moth development in the vicinities of Moscow are given (egg mass distribution, phenology, major food plants).
ECentral; GENERAL BIOLOGY

170 Benkevich, V.I. 1950.
Gypsy moth ecology. Avtoreferat dissertatsii kandidata biologicheskikh nauk. Moscow. 22 p.
-- Data on gypsy moth biology and ecology in Moscow Province are presented. Investigations were carried out in stands of various types in 1983-1989. Egg mass distribution, phenology, biotope adjustment, effect of meteorological conditions and other peculiarities of gypsy moth development in Moscow Province were studied.
ECentral; GENERAL BIOLOGY

171 Benkevich, V.I. 1952.
Preferred oviposition sites by the gypsy moth. Les i stepi. 12:75-76.
-- Distribution of gypsy moth egg masses was studied in Moscow Province in 1938-1951. Stand infestation was found to depend on the stand type, its composition, age, density, and whether there was undergrowth. The number of egg masses is different on forest edges of different exposure, and there are more egg masses on forest edges than in the depth of a stand. For oviposition, the most favored species were old oak, spruce, young birch trees, larch, pine and linden, in decreasing order. As for biotopes, females prefer the most elevated sites, dry parts of the forest, and trees under which soil moisture is the lowest -- under oak and spruce. For pest population counts, it is advisable to examine the most elevated plots of stands in southern, southeastern and eastern parts of the forest.
ECentral; EGG MASSES, OVIPOSITION SITE, SAMPLING, STAND COMPOSITION

172 Benkevich, V.I. 1955.
Detection of tree trunks, forest plots and margins most infected with gypsy moth egg masses. In: Uchenyye zapiski Orekhovo-Zuyevskogo pedagogicheskogo instituta. Moscow: 177-185.
-- In Moscow Province, stand plots in the southern, southeastern, and eastern parts of the forests, with a background composed of old spruce and young birch, were the most heavily infected with egg masses. The reason for this is that such plots are less subject to cooling, more exposed to light, and it is easier for females to find shelter from the northerly and westerly winds which prevailed in the oviposition period. The majority of egg masses are located on the southern and eastern sides of trees. The number of egg masses on the trunks, absolute and relative infestation of plots and forest edges, is inversely related to the height at which egg masses are located above the soil surface.
ECentral; OVIPOSITION SITE, SAMPLING, STAND COMPOSITION

173 Benkevich, V.I. 1955.
The role of solar radiation energy in the heat balance of developing gypsy moth eggs. In: Uchenyye zapiski Orekhovo-Zuyevskogo pedagogicheskogo instituta. Moscow: 163-175.
-- Solar radiation provides additional energy which produces a considerable effect on the course and duration of embryonic development in spring. During 50-60 days, the thermal effect of radiation on egg masses makes the sum of effective temperatures about 30% higher than reported in meteorological data. This correction does away with an absurd notion of more rapid development of eggs in nature than in the laboratory. This correction is not valid if eggs masses are in shelters. Spring development of larvae is a special stage of embryonic development which is completed in 121 degree-days at a minimum temperature of 5.7°C, and at a photoperiod of 13.1-15.7 hours.
ECentral; DIAPAUSE, EGG HATCH, MODELS, TEMPERATURE

174 Benkevich, V.I. 1956.
The distribution of gypsy moth (*Porthetria dispar* L.) egg masses over territory of the mountain Altai. Zoologicheskiy zhurnal. 35(7):1013-1016.
-- Gypsy moth egg masses usually are found on sunny slopes and terraces of broad valleys. Southern and eastern slopes are the most heavily infected, while northern and western slopes are slightly infected. Plots infected with egg masses are always steppe-like, and tree stands are light, their major species being birch, fir, pine, larch, and spruce. The forests of river terraces and parklands also are heavily infected. Gypsy moth populations in Altai are characterized by the shift of

oviposition from trees to rocks. Females lay the maximum number of egg masses on the rocks if the steppization is high, there are few trees suitable for oviposition, and they are occupied first by other females. The average height of oviposition is 12 to 15 cm above the soil surface. In general, females can find a great diversity of oviposition sites depending on the location of their emergence, but they tend to seek shelters with the best microclimate.
ECentral; OVIPOSITION SITE, STAND COMPOSITION

175 Benkevich, V.I. 1957.
Determination of forest areas most preferred by gypsy moth as oviposition sites. In: Uchenyye zapiski Orekhovo-Zuyevskogo pedagogicheskogo instituta. Moskva: 65-70.
-- The distribution of gypsy moth egg masses was studied in Moscow Province. Trunk infestation with egg masses was found to be heavier at forest edges than in the middle of the forest. In addition, infestation decreased drastically as the trunk diameter increased. Moreover, infestation of a plot decreases sharply with closing of leaf canopy. In studying egg mass distribution by compass points, infestation decreased in the following order: south, east, west, north. For oviposition, the most suitable plots are those where favored food species prevail and the grass stand is low, particularly along the southern, southeastern, and eastern edges of such forests.
ECentral; EGG MASSES, OVIPOSITION SITE

176 Benkevich, V.I. 1957.
Plants damaged by gypsy moth at normal and maximum population densities. In: Uchenyye zapiski Orekhovo-Zuyevskogo pedagogicheskogo instituta. Moskva: 71-78.
-- In Moscow Province, species composition of favored food plants by larvae and those preferred for oviposition by adults was studied. For oviposition, females appear to prefer old spruce, young birch, and then, in decreasing order, pine, larch, linden, and old oak. For feeding, the most favored species are oak and linden, follow by poplar and birch. First instars migrate from the oviposition sites to preferred food plants. In the period between outbreaks, larvae feed on one or two food plants which, the author believes, makes insects more viable. During outbreaks, all larvae migrate to unfavored food plants. This feeding pattern makes the physiological condition of insects worse. Gypsy moth outbreaks can only occur in areas where favored food species and species favorable for oviposition are available.
ECentral; BEHAVIOR, FEEDING, HOST PLANTS, OVIPOSITION SITE

177 Benkevich, V.I. 1958.
Peculiarities of gypsy moth embryonal development on the southern shore of the Crimea. In: Uchenyye zapiski Orekhovo-Zuyevskogo pedagogicheskogo instituta. Moskva: 115-118.
-- Diapause of Crimean and Caucasian gypsy moth populations on the southern shore occurs at high, steadily lowering temperatures with the temperature decreasing from the annual average maximum to the lower development limit. The diapause of the northern pest populations, however, only takes its normal course at low temperatures. In the mountains, plain forests, and river valleys of the Crimea and Caucasus, diapause also occurs at temperatures below or close to 0 C. A conclusion is made about a different course of diapause in the southern shore population and other populations of the Crimea and Caucasus.
EWest, Caucasus; DIAPAUSE, GEOGRAPHIC VARIATION

178 Benkevich, V.I. 1958.
Various tree species and their age groups as a substrate for gypsy moth oviposition. Nauchnyye doklady vysshey shkoly, biologicheskiye nauki. (4):26-30.
-- The author notes that fertilized gypsy moth females become very sensitive to weather conditions. This is seen primarily in locations where egg masses are found at a height of about 10 cm above the soil surface. Once females are fertilized, up to 80% will leave their emergence sites and fly or crawl to other trunks. The maximum distance covered by flying females in Moscow Province is about 200 m and flight is slow and heavy. If a female cannot immediately find a place with suitable microclimate, she flies again. In rainy weather, females use any shelter for oviposition. However, if the rain has stopped and oviposition has not yet started, the females leave the shelter and oviposit near it on the southern or southeastern side of a trunk. A female usually deposits 1 and, very rarely, 2 to 4 egg masses.
ECentral; FEMALES, FLIGHT, OVIPOSITION SITE, WEATHER

179 Benkevich, V.I. 1958.
The prediction gypsy moth outbreaks and its control in the USSR. In: 1 Mezhvuzovskaya konferentsiya po zashchite lesa. Tezisy dokladov. Moscow: 52-61.
-- Protective measures for gypsy moth control consist of finding primary foci and destroying egg masses there. Egg masses are often deposited by females on substrate unsuitable for larval feeding, such as trees with rough bark, stones, etc. Distribution of egg masses depends on hydrothermal conditions in the oviposition period. The higher the temperature, the fewer the egg masses deposited on southern sides; more are deposited on the northern side. The higher the humidity, the higher is deposition of egg masses and pupae on the trunks. The pest prefers light stands, forest edges, and ridges. Males can be killed by light traps when it is dark and by attractant-baited traps.
OVIPOSITION SITE, WEATHER

180 Benkevich, V.I. 1959.
Effect of temperature on embryo development of the gypsy moth, *Ocneria dispar* L., in Moscow region. In: Trudy Orekhovo-Zuyevskogo pedagogicheskogo instituta. Ekologiya i sistematika zhivotnykh. Moscow: 52-61.
-- The gypsy moth usually has a winter diapause in its life cycle, but hatching sometimes occurs in autumn. This can occur when larvae get a total sum of effective temperatures before frosts start; this sum is equal to the sum of effective temperatures before and after diapause. Hatching also is provoked by a fall in temperature to 0° C for a short time in the period both before and after diapause. Under such temperature conditions, larvae that

hatched in autumn die as do eggs that received a sum of effective temperatures before diapause and a partial sum of effective temperatures after diapause. Only eggs that received a sum of effective temperatures before diapause overwinter well.
ECentral; DIAPAUSE, TEMPERATURE

181 Benkevich, V.I. 1959.
The use of ultraviolet radiation in control of the gypsy moth *Porthetria dispar* L. Nauchnyye doklady vysshey shkoly, biologicheskiye nauki. (3):39-42.
-- Great numbers of gypsy moth males and virgin females are found to fly to ultraviolet light sources. This leads to a sharp increase in the number of unfertilized females depositing sterile eggs. Thus, ultraviolet light traps can be used for continuous monitoring of pest populations and numerical dynamics. Male trapping in primary foci is an effective control measure in a latent phase but, during outbreaks, ultraviolet light sources are not effective.
ECentral; CONTROL, FEMALES, FLIGHT, LIGHT TRAPS, MALES

182 Benkevich, V.I. 1959.
Outlines on the gypsy moth *Ocneria dispar* biology. 1 Report. Biology of the gypsy moth males. In: Trudy Orekhovo-Zuyevskogo pedagogicheskogo instituta. Sbornik rabot po ekologii zhivotnykh. Moscow: 31-51.
-- In Moscow Province, the mean life span of males was 12 hours 56 minutes. The range varied from 6 hours 43 minutes to 30 hours 35 minutes. The highest sensitivity of males to worsening conditions is in the period from emergence to mating. As a result, mating can be delayed, eggs would be of poor quality, and the offspring would be unviable. Searching for females, males use their olfactory analyzer for broad-range searches while vision and touch are used for microfocusing. Female attractants can be used for trapping and killing of males.
ECentral; MALES, MATING, NUMERICAL DATA

183 Benkevich, V.I. 1961.
Gypsy moth outbreaks and their prediction in the lower Volga River Valley. In: Trudy Orekhovo-Zuyevskogo pedagogicheskogo instituta. Ekologiya i sistematika zhivotnykh. Moscow: 30-48.
-- In the lower Volga River Valley, a gypsy moth outbreak is preceded for a period of 4 to 5 years by special meteorological conditions. Three or 4 years before the outbreak, the winter is cold and dry, and no less than two successive winters are severe or close to the norm. Three years before the outbreak, larvae develop in drought conditions (May and June), and for no less than 2 years, May is very dry. Under such hydrothermal conditions, gypsy moth viability and survival increase resulting in drastically higher numbers of the pest.
ECentral; OUTBREAKS, PROGNOSIS, WEATHER

184 Benkevich, V.I. 1961.
Gypsy moth outbreaks and their prediction in the Moscow region. In: Trudy Orekhovo-Zuyevskogo pedagogicheskogo instituta. Ekologiya i sistematika zhivotnykh. Moscow: 22-29.
-- A gypsy moth outbreak was preceded for a period of 2 to 5 years by severe winters and droughts. As a result, insects were more viable and an outbreak occurred.
ECentral; OUTBREAKS, PROGNOSIS, WEATHER

185 Benkevich, V.I. 1961.
Gypsy moth outbreaks and their prediction in the Ulyanovsk region and Bashkirian Autonomous Republic. In: Trudy Orekhovo-Zuyevskogo pedagogicheskogo instituta. Ekologiya i sistematika zhivotnykh. Moscow: 49-59.
-- As in other regions, a gypsy moth outbreak is preceded by special hydrothermal conditions: severe winters and drought in summers. But unlike other regions, in the conditions under study, humidity in May and June is higher or near normal 2 years before the outbreak.
ECentral; OUTBREAKS, PROGNOSIS, WEATHER

186 Benkevich, V.I. 1962.
Gypsy moth outbreaks in East Siberia. Entomologicheskoye obozrenie. 41(1):22-29.
-- In East Siberia, periodicity of gypsy moth outbreaks is 20 to 25 years. Outbreaks occur under certain hydrothermal conditions: droughts in summer and severe, dry winter. Every gypsy moth outbreak is preceded for some years by severe winters and droughts in spring and summer. In the periods between outbreaks, the gypsy moth can be found in survival stations (slopes with southern exposure, in open stands).
WSiberia; OUTBREAKS, PROGNOSIS, SITE CONDITIONS, WEATHER

187 Benkevich, V.I. 1962.
Gypsy moth population dynamics as affected by stand state and weather conditions. In: Nauchnaya konferentsiya po voprosam massovykh razmnozheniy vrediteley lesa. Ufa: 10-16.
-- Gypsy moth numerical increase usually begins when solar activity is decreasing or are at a minimum, but under conditions of drought, numerical increase also is observed during the period of increased solar activity. Special climatic conditions can be observed: the outbreak is preceded by a severe, dry winter for no less than 2 years, which causes higher mortality of entomophages and lowers their activity. For no less than 2 years, there are droughts in May and June and, just before the outbreak occurs, the winters of two successive years are again severe.
ECentral; OUTBREAKS, PROGNOSIS, SOLAR ACTIVITY, WEATHER

188 Benkevich, V.I. 1963.
Materials on predicting gypsy moth, *Ocneria dispar* L. (Lepidoptera, Liparidae) outbreaks. Report 5. Gypsy moth outbreaks and their prediction in the Voronezh region. Nauchnyye doklady vysshey shkoly, biologicheskiye nauki. (1):17-22.
-- Outbreaks occur if they are preceded by 2 or 3 successive severe winters (particularly during the first half) and a lower hydrothermal coefficient during May and June 3 years before the outbreak.
ECentral; OUTBREAKS, PROGNOSIS, WEATHER

189 Benkevich, V.I. 1964.
Methods to predict outbreaks of the gypsy moth, *Ocneria dispar* L. (Lepidoptera, Liparidae). Report 7: Gypsy moth outbreaks and their prediction in forests of the Crimea. In: Trudy Orekhovo-Zuyevskogo pedagogicheskogo instituta. Ekologiya i sistematika zhivotnykh. Moscow: 67-82.
-- Gypsy moth outbreaks in the Crimea are preceded by a more severe than normal winter, and by larval development at a low hydrothermal coefficient during May and June 3 years before the outbreak. This reduced the numbers of parasites and lowered their vitality due to the impact of frost and better food quality as a result of weakening during the drought period.
EWest; OUTBREAKS, PARASITES, POPULATION DYNAMICS, WEATHER

190 Benkevich, V.I. 1964.
Methods to predict outbreaks of the gypsy moth, *Ocneria dispar* L. (Lepidoptera, Liparidae). Report 8. Gypsy moth outbreaks and their prediction in the forests of Altai Territory and East Kazakhstan. In: Trudy Orekhovo-Zuyevskogo pedagogicheskogo instituta. Ekologiya i sistematika zhivotnykh. Moscow: 83-95.
-- Studies were made of the hydrothermal regime preceding gypsy moth outbreaks in Altai Krai and eastern Kazakhstan during the period from 1894 to 1960. An outbreak must be preceded by cold, dry winters and droughts in May and June, which leads to numerical reduction of parasites and higher quality of food.
WSiberia; FOLIAGE QUALITY, OUTBREAKS, PARASITES, WEATHER

191 Benkevich, V.I. 1966.
The biology and ecology of larval instars of the gypsy moth, *Ocneria dispar* L. (Lepidoptera. Liparidae). Report 1. Peculiarities in biology of first-instar larvae in the gypsy moth, *Ocneria dispar* L. (Lepidoptera, Liparidae). In: Trudy Orekhovo-Zuyevskogo pedagogicheskogo instituta. Ekologiya i sistematika zhivotnykh. Moscow: 42-66.
-- Investigations have shown that larvae hatch at different times depending on the latitude, altitude above sea-level, biotope, and meteorological conditions of the given year. Within one biotope, hatching dates fluctuate greatly depending on the localization site of egg masses in the area, on the nature and properties of the substrate on which egg masses are deposited, and on the height and direction of egg mass position on the substrate. All of these factors extend the hatching period. Whether the dates of hatching and major food species foliation would be synchronous or asynchronous is partially determined by the direction and duration of temporal shifts in hatching dates of the majority of larvae. The duration of the first-instar stage depends on hydrothermal conditions, and feeding conditions, among other factors.
ECentral; EGG HATCH, PHENOLOGY

192 Benkevich, V.I. 1966.
Outbreaks of the gypsy moth, *Ocneria dispar* L. (Lepidoptera, Liparidae) in the European part of the USSR relative to solar activity fluctuations, cyclic changes in atmosphere, climate and weather. In: Trudy Orekhovo-Zuyevskogo pedagogicheskogo instituta. Ekologiya i sistematika zhivotnykh. Moscow: 3-41.
-- Large-scale gypsy moth outbreaks occur in the territory of the European part of the USSR during periods of decline and minimum activity within 11-year cycles. These outbreaks occur against the background of the integral curve of centenary fluctuations of Wolf numbers. The fluctuations occur 2, 3, or 4 years after the maximum recurrence index, with maximum development of meridional processes in May and June, from November to March, and particularly in January and February. This macrosynoptic situation brings about a dry May and June, and cold, dry winters, and can be used to determine a favorable period for gypsy moth outbreak, but not its locality. Therefore, changes of weather conditions in specific territories should be analyzed and continuous monitoring of physiological condition and numbers of the pest in all survival stations should be conducted.
ECentral; POPULATION FLUCTUATION, PROGNOSIS, SOLAR ACTIVITY, WEATHER

193 Benkevich, V.I. 1966.
Outlines on the gypsy moth, *Ocneria dispar* L., biology. Report II. The behavioral patterns in unfertilized gypsy moth females. In: Trudy Orekhovo-Zuyevskogo pedagogicheskogo instituta. Ekologiya i sistematika zhivotnykh. Moscow: 67-80.
-- A gypsy moth female is attractive to males just after emergence. As soon as their wings are dry and spread, females actively select places with optimum hydrothermal and light conditions such as locations with temperatures ranging from 18°C to 25°C, and shady places protected from the wind. In central regions of the European part of the USSR, such conditions are usually observed at southern, eastern, and southeastern edges of forests, and on the mountain slopes of the same exposure with stands of low density. Sterile females fly better than fertilized ones, but females of the middle Russia population can fly actively only for a distance of 800 to 1000 m. Females of the Asian population are strong flyers.
ECentral; FEMALES, FLIGHT, MATING

194 Benkevich, V.I. 1967.
Factors regulating gypsy moth population dynamics in central regions of European part of the USSR. In: Nauchnaya konferentsiya posvyashchennaya itogam nauchno-issledovatel'skoy deyatel'nosti Orekhovo-Zuyevskogo pedagogicheskogo instituta. Tezisy dokladov. Orekhovo-Zuevo: 1O5-1O7.
-- Large-scale gypsy moth outbreaks in the European part of the USSR are related to periods of decline and minimum solar activity during 11-year cycles occurring against the background of the integral curve of centenary fluctuations of Wolf numbers. This occurs 2, 3, or 4 years after the maximum recurrence index and maximum development of meridional processes showing themselves as droughts in May and June, and cold, dry winters. Recognizing these situations, it is possible to determine an outbreak period; actual outbreaks in specific regions are determined by environmental conditions of specific populations.
ECentral; OUTBREAKS, PROGNOSIS, SOLAR

ACTIVITY, WEATHER

195 Benkevich, V.I. 1968.
Gypsy moth outbreaks in the European part of the USSR as related to solar activity fluctuations, atmospheric circulation, climate and weather conditions. In: Trudy XIII Mezhdunarodnogo entomologicheskogo kongressa. Nauka, Moscow: 14-15.
-- Gypsy moth outbreaks sometimes occur on a large scale across vast territories. Outbreaks recorded in various regions of the Soviet Union during the period from 1890 to 1957 were correlated with cycles of solar activity. These outbreaks were found to last 2 to 4 years, each preceded by a year of the maximum index Sm; i.e., they occurred in the years when the number of sunspots is the most constant and when active spot generating of the sun is at its peak. It can be accounted for by the drop of the integral curve of 80-90-year cycles of solar activity (Wolf number) when in the atmosphere western circulatory processes develop that coincide with gypsy moth outbreaks over large areas related to the 11-year cycle of solar activity. A description is made that connects the processes of atmospheric circulation determined by the sun with gypsy moth outbreaks.
ECentral; OUTBREAKS, SOLAR ACTIVITY, WEATHER

196 Benkevich, V.I. 1970.
On the question of correlative links between solar activity fluctuations, atmospheric circulations and number of areas damaged by outbreaks of gypsy moth, *Ocneria dispar* L., in the European part of the USSR. In: Uchenyye zapiski Moskovskogo gosudarstvennogo pedagogicheskogo instituta. Moscow: 16-52.
-- Solar activity and circulatory atmospheric transformations are highly and reliably correlated with the number of regions where gypsy moth outbreaks occur. The correlations established overlap and they are different in different solar and circulatory epochs. A centenary cycle of solar activity shows itself as centenary changes of the number of regions of gypsy moth outbreaks; multi-rhythmic cycle is also a property of solar activity and circulatory atmospheric transformations. A high correlation of solar activity with circulatory atmospheric transformations and with the number of regions of gypsy moth outbreaks mathematically confirms the basic principles of synoptic theory of population dynamics.
ECentral; OUTBREAKS, SOLAR ACTIVITY, WEATHER

197 Benkevich, V.I. 1971.
Food plant choice by gypsy moth larvae relative to ether oil, terpenes, polyterpenes and tannin contents in leaves and needles. In: Nauchnaya konferentsiya Orekhovo-Zuyevskogo pedinstituta. Tezisy dokladov. Moscow: 16-21.
-- The gypsy moth feeds on the plants of the order Coniferae. The essential oil of the conifer needles contains, as a rule, both neopinene and pinene of equal optical activity. More seldom, pinene, or pinene as well as limonene, can be substituted with pinene or tannins. The combination of these substances produces a "bouquet" that is attractive to insects. Needles containing such a combination will be a favored food.
ECentral; FOLIAGE CHEMISTRY

198 Benkevich, V.I. 1974.
Indicators of the physical state of a gypsy moth population relative to its density and performance of abiotic factors during "A + B" circulatory epoch. In: Materialy VII s"yezda Vsesoyuznogo entomologicheskogo obshchestva. Nauka, Leningrad: 192-193.
-- Studies were made in the Orekhovo-Zuevo Forest of Moscow Province in 1950-1964. The relationship of abiotic factors with population dynamics phenomena and processes was established. The dynamic sequences compared with averages over a 2-year period.
ECentral; POPULATION DYNAMICS, WEATHER

199 Benkevich, V.I. 1978.
Gypsy moth population structure relative to cyclic fluctuations within some components of a biogeocenosis. In: Doklady MOIP. II polugodiye 1975 goda. Zoologiya i botanika. Moskva: 18-21.
-- The author believes all the elements of a multicomponent relationship - solar activity, circulatory atmospheric transformations, climate and weather - effect the population density, physiological parameters of tree and pest condition, and gypsy moth mortality. A well-balanced genetic pool of the population is formed by innumerable generations under the impact of cyclic changes in pest population density and environmental conditions. During periods of population increases and outbreaks, individuals from different survival stations mate, and lethal combinations of genes are accumulated. The genetic pool is the richest at this time. When foci are reduced, the genetic pool is poorer and the number of homozygotes grows. However, good combinations occur, which allow the population to overcome depression. An outbreak can be induced not only by the pest population (self-regulation), but also by lower plant resistance. During outbreak suppression, entomophages are of great importance. All these factors are interrelated.
ECentral; GENETICS, OUTBREAKS, POPULATION QUALITY, SOLAR ACTIVITY, WEATHER

200 Benkevich, V.I. 1978.
Indicators of the physical state of a gypsy moth population relative to its density and performance by abiotic factors in last circulatory epoche. In: Doklady MOIP. I polugodiye 1975 goda. Zoologiya i botanika. Moskva: 71-75.
-- In some regions of the USSR, gypsy moth outbreaks are preceded by a solar-meteorological situation specific for every region, similar to that recognized by M.L. Khanislamov (1963) for Bashkiria. Reliable at the highest level of significance, the relationship between the outbreaks and the preceding meteorological situation were established by of finding the tetrachoric coefficient. The outbreak had been preceded by a drought and a severe, dry winter 3 years before. Observations were carried out from 1950 to 1964 in the Orekhovo- Zuevo Forest of Moscow Province. Correlation coefficients are given for 50 dynamic sequences that demonstrate the extent to which gypsy moth ecological characteristics depend on a number of meteorological parameters.

ECentral; MODELS, OUTBREAKS, SOLAR ACTIVITY, WEATHER

201 Benkevich, V.I. 1979.
Some mechanisms regulating gypsy moth population dynamics. In: Novyye problemy zoologicheskoy nauki i ikh otrazheniye v vuzovskom prepodavanii. Tezisy dokladov nauchnoy konferentsii zoologov pedinsitutov. Stavropol: 48-49.
-- This survey was made in the Orekhovo-Zuevo Forest from 1950-1964. Significance of various factors limiting the increase of gypsy moth populations was determined and their action at different life stages was clarified. The cycle is considered to begin with a low population level that gradually increases by the fifth to seventh year and reaches its peak by the ninth year. The tenth year marks the beginning of the depression period. With respect to embryogeny during the first years of the cycle, egg parasites perform control functions, and the proportion of undeveloped embryos increases (until the third year) as does the role of vertebrates for control (until the fourth to sixth year). From the sixth to the ninth year, mortality caused by invertebrate predators increases. After the tenth year, as the population reaches the crisis phase, activity of invertebrates increases again, and after the twelfth year, the number of undeveloped eggs becomes greater.
ECentral; POPULATION FLUCTUATION

202 Benkevich, V.I. 1983.
Fluctuations in gypsy moth abundance relative to changes in the physical state of food plants caused by solar activity. In: Doklady MOIP. Zoologiya i botanika 1981. Teoreticheskiye i prikladnyye aspekty rezul'tatov izucheniya rasteniy i zhivotnykh. Moskva: 8-10.
-- Gypsy moth outbreaks in Moscow and Voronezh Provinces were analyzed for a period of about 100 years. The relationship between the physiological condition of trees and their susceptibility to gypsy moth attack to perennial changes of solar activity is shown. Pest outbreaks in Moscow Province were always preceded by very early foliation of oak and birch 1 or 2 years before. For 2 years or 1 year prior to outbreak, or during the year of outbreak, gypsy moth hatching dates coincided with oak foliation dates or were not more than 2 days ahead of them.
ECentral; FOLIAGE QUALITY, OUTBREAKS, PHENOLOGY, SOLAR ACTIVITY

203 Benkevich, V.I. 1984.
Gypsy moth outbreaks in the European part of the USSR. (Massovyye poyavleniya nepamogo shelkopryada v Evropeyskoy chasti SSSR.) Nauka, Moscow. 143 p.
-- The relationship between gypsy moth population dynamics and 11-year, 22-year, centenary, and other solar cycles is shown. It was discovered that there is a relationship between solar activity rhythm, atmospheric processes and weather phenomena, biochemical composition and quantity of food of the gypsy moth, and the physiological condition of parasites and predators attacking the gypsy moth. Possibilities for forecasting gypsy moth population dynamics are shown.
EWest, ECentral, EEast; FOLIAGE QUALITY, OUTBREAKS, PROGNOSIS, REVIEW, SOLAR ACTIVITY, WEATHER

204 Benkevich, V.I. 1984.
Gypsy moth occurrence in the European part of the USSR over the last century in relation to sharp changes in solar activity. In: Tezisy dokladov IX s"yezda Vsesoyuznogo entomologicheskogo obshchestva. Naukova Dumka, Kiev: 52.
-- Solar activity can produce a dual effect: cyclic background of Earth processes and distortion of this background. The former effect shows itself in relation to the number of regions where gypsy moth outbreaks occur to the centenary cycle of solar activity. The latter effect can be seen in relation to the number of regions and areas of foci (thousands of hectares) to rare changes and extremes of solar activity. Solar activity is not an ordinary modifying factor. Its regulating function is to put into action other modifying factors and make them cyclic. Cyclic numerical fluctuations are inherent in a population. They would occur even if solar activity were stable, but they would be different.
ECentral; OUTBREAKS, SOLAR ACTIVITY

205 Benkevich, V.I. 1988.
The mortality of gypsy moth larvae due to entomopathogens and disease in connection with sunspots, climate, and weather (in German). [Die Sterblichkeit der Raupen des Schwammspinners, *Lymantria dispar* L. (Lepidoptera, Liparidae) wegen Entomophagen und Krankheiten in Zusammenhang mit der Sonnenfleckenintensitat, dem Klima und dem Wetter.] In: XII Mezhdunarodnyy simpozium po entomofaune Sredney Evropy. Kiev, 25-30 sentyabrya 1988. Tezisy dokladov. Naukova Dumka, Kiev: 23.
-- Mortality of gypsy moth larvae caused by entomophages and diseases was studied from 1950 to 1984 in Moscow Province. The level of mortality was found to be dependent on biotic factors and on solar activity as manifested by climate and weather. Correlation coefficients of different parameters ranged from 0.770 to 0.909.
ECentral; MODELS, SOLAR ACTIVITY, WEATHER

206 Benkevich, V.I. 1990.
The relationship between solar-climatic situations and outbreak of the gypsy moth, *Lymantria dispar* L. (Lepidoptera, Lymantriidae), in the Moscow Region over 120 years. Entomologicheskoye obozrenie. 69(1):3-13.
-- Gypsy moth outbreaks were found to be highly (and reliably) correlated to two solar-climatic situations. If one of these situations is observed before the mid-90s, the eruption phase of an outbreak will occur in the Moscow Province in 1989-1990 or in the mid-90s.
ECentral; OUTBREAKS, PROGNOSIS, SOLAR ACTIVITY

207 Benkevich, V.I., Nazarov, I.A. 1964.
Methods to forecast gypsy moth, *Ocneria dispar* L. (Lepidoptera, Liparidae), outbreaks. Report VI. Gypsy moth (O. dispar L.) outbreaks and their forecast in the Ryazan Region. In: Trudy Orekhovo-Zuyevskogo

pedagogicheskogo instituta. Ekologiya i sistematika zhivotnykh. Moscow: 28-66.
-- Gypsy moth population dynamics and possible causes of outbreaks in the Ryazan Province from 1943 to 1963 are analyzed. The relationship of outbreaks to the coefficient of winter severity as well as to the temperature and humidity of the first half of summer is established. Additionally, the analysis of data on gypsy moth population dynamics since 1856 is made and the relationship of outbreaks to weather conditions is recognized.
ECentral; OUTBREAKS, PROGNOSIS, WEATHER

208 Ben'kovskaya, G.B., Idrisova, N.T. 1985.
The remote effect of juvenoids on gypsy moth ontogenesis. Lesnoye khozyaystvo. (2):63-65.
-- The effect of preparations of aldosar and aldoside on the gypsy moth was studied in two subsequent generations. One application was made of different concentrations of preparations ranging from 0.00001 to 0.1% and applied to III-IV instars. Juvenoids were shown to produce a continuous effect throughout gypsy moth morphogenesis and, in the next generation, embryogeny was particularly affected. Juvenoids are a promising means of pest control.
EEast; GROWTH REGULATORS, PHYSIOLOGY

209 Berdanov, G.B. 1925.
Agricultural pest fauna of the eastern foothills of the Northern Caucasus. In: Izvestiya Inguschskogo NII kraevedeniya. Groznyy: 111-130.
-- One hundred sixteen pest species (insects and rodents) are listed. Of these, 24 species are Lepidoptera, including the gypsy moth. It attacks apple, pear, and other orchard and ornamental plants.
Caucasus; HOST PLANTS, PEST LIST

210 Berdennnikova, S.P., Kutsenogii, K.P., Kirov, Ye.I., Sakharov, V.M., Chankina, O.V. 1977.
Laboratory study of efficacy of highly dispersed insecticide aerosols. Sibirskiy vestnik sel'skokhozyaistvennoy nauki. 7(1):42-48.
WSiberia; CHEMICAL INSECTICIDES

211 Berim, N.G., Druzhelyubova, T.S. 1958.
Anatomical and hystological changes in the gypsy moth, *Porthetria dispar* L., larvae when treated with insecticides. Entomologicheskoye obozrenie. 37(2):252-259.
-- When gypsy moth larvae are treated with DDT, sodium fluoride, calcium arsenite, mixtures of DDT and sodium fluoride, DDT and calcium arsenite, not only is their metabolism upset but morphological changes in the nervous system, intestines, and fat body occur. In the nervous system, nerve cells and ganglia degenerate and the volume of cerebral substance shrinks; intestine epithelium is destroyed, the fat body shrinks, and its cells are deformed and decreased. Changes in the fat body are specific towards specific insecticides.
ECentral; CHEMICAL INSECTICIDES, HISTOLOGY, NEUROLOGY

212 Berim, N.G., Sekun, N.P. 1977.
Pathology of gypsy moth hemolymph when treated with insecticides. In: Nauchnyye trudy Leningradskogo sel'skokhozyaystvennogo instituta. Leningrad: 41-44.
-- When larvae were treated with insecticides, their general hemolymph pattern changed compared to the norm. Later, not only does the ratio of hemocytes change but patho-morphological changes occur both in the cytoplasm and the nucleus. All the insecticides tested - chlorophos, trichlormetaphos-3, DDTVPh and their mixtures - caused similar hematological and histological changes.
ECentral; CHEMICAL INSECTICIDES, HEMOLYMPH

213 Bezhanishvili, T.D. 1974.
Gypsy moth entomophages in Georgia and their sensitivity to insecticides. In: Materialy sed'mogo s"yezda Vsesoyuznogo entomologicheskogo obshchestva. USSR Academy of science, Leningrad: 21-22.
-- The list of parasites includes: *Calasoma sycophanta, Itoplectis alternatus, Pimpla examinator, Meteorus versicolor, Apanteles melanoscelus, Apanteles melitaearum, Monodontomerus aereus*
Caucasus; CHEMICAL INSECTICIDES, PARASITES

214 Blagodatskaya, G.I., Voitenko, N.M. 1968.
Comparative study of morphological and physiological peculiarities of neurosecretory cells of epipharyngeal ganglion in the tent caterpillar, gypsy moth and satin moth. In: Naukovi pratsi USGA. Dostidzhennya z fitopatologii. USGA, Kiev: 72-75.
-- Data are presented on the location of groups of neurosecretory cells of the superesophageal ganglion of the tent caterpillar, gypsy moth, and satin moth. Their morphology and paths of neurosecretory substance transfer also are given. Neurosecretory cells of the species under study respond differently to dyes, which the authors regard as evidence of different properties of the secreta produced by neurosecretory cells.
EWest; ENDOCRINOLOGY

215 Bogach, A.V., Zolotoverkhaya, I.M., Kirichenko, E.I. 1966.
Impact of light and temperature on propagation of some lepidopterous (*Porthetria dispar* L., *Bombyx mori* L.) species. Doklady Akademii nauk Ukrainskoy SSR (Dopovidni Akademii Nauk Ukrains'koy RSR). (6):825-827.
-- Experiments on the effect of light and temperature on mating, fertilization and oviposition of the gypsy moth and the silkworm show that light alone and in combination with temperature affects moth emergence and flight dynamics, fertilization, and oviposition. Photoperiodic effect is observed most clearly at low temperatures. The effect on mating, fertilization, and oviposition by changing light and temperature shows that temperature is more influential when both factors act together.
EWest; MATING, OVIPOSITION BEHAVIOR, PHOTOPERIOD, TEMPERATURE

216 Boiko, G.Ye 1990.
Investigation of modification and utilization of phenolic compounds of oak by gypsy moth and oak roller larvae. In: Uspekhi entomologii v SSSR: lesnaya entomologiya. Materialy X s"yezda Vsesoyuznogo entomologicheskogo obshchestva. Nauka, Leningrad: 22-23.
EWest; FOLIAGE CHEMISTRY, NUTRITION

217 Boness, M. 1975.
Disparlure: comparison of efficacy in field experiments against *Lymantria dispar* L., *Lymantria monacha* L. In: VIII Mezhdunarodnyy kongress po zashchite rasteniy, doklady i soobshcheniya sektsii V. Biologicheskiye i geneticheskiye metody bor'by. Nauka, Moscow: 35-41.
-- Disparlure was found to possess group specificity (for the Lymantria group). Normally, the gypsy moth is active during the day with maximum flight activity from 11 a.m to 3 p.m. (FRG). In Sardinia, gypsy moth can be active in the evening and also at night, depending on temperature. Gypsy moth females are reluctant to fly and are not vagile before copulation. Vision probably plays an important role in the searching activity of males of this species, especially when the density level is high. Therefore, during an outbreak, males have a weak response to artificial pheromones. By contrast, in sparse populations, male response to the pheromone was strong. Because males emerge earlier than females, their response to disparlure was strongest at the beginning of summer when there were few, if any, females. This allows for rather effective destruction of males with sticky attractant-baited traps at the beginning of a population increase, but during an outbreak they are not effective.
EWest; CONTROL, FEMALES, FLIGHT, PHEROMONE TRAPS

218 Borisoglebskaya, M.S. 1977.
Lepidoptera - the fruit-tree pests. Zashchita rasteniy. (1):59-60.
-- Gypsy moth egg masses are found on the bark at the base of trees, on stumps, and on the lower part of fences and houses near and on the fruit orchards of Rosaceae fruit trees.
ECentral; OVIPOSITION SITE

219 Borisoglebskaya, M.S. 1979.
The necessity of protecting decorative plants. Zashchita rasteniy. (7):61.
ECentral; CONTROL, OVIPOSITION SITE

220 Borisova, O.D., Pugachev, V.G. 1989.
Extraction and cleansing of nuclear polyhedrosis virus of gypsy moth, cabbage looper, and bollworm in production of virus insecticides. In: Biologicheskiye i tekhnologicheskiye problemy sozdaniya virusnykh preparatov dlya integrirovannoy zashchity rasteniy. Novosibirsk: 35.
-- In pilot experiments, a crude homogenate of dead larvae is presently used for producing preparations. Large-scale production material used for inoculation requires additional cleansing of foreign microflora. Since polyhedra are similar to microorganisms in some parameters, e.g., buoyant density and size, certain difficulties in selecting the techniques for polyhedra cleansing arise. Polyhedra cleansing in the gradient of glycerol density and pretreatment of crude homogenate of larvae with detergents, lysozyme, or hyaluronidase did not lower the titer of microorganisms. Treatment with sodium dodecyl-sulphate did lower the titer of microorganisms by one order of magnitude. Incubation in TES-buffer (tris - 0.1 M, EDTA -0.004 M, SDS - 1 %) at 30°C for 1.5 hr caused a decrease in the microorganism titer by more than 3 orders of magnitude, preserving the infectivity of baculoviruses.
MICROBIAL PESTICIDES, VIRUS

221 Bryantsev, B. 1928.
Several observations of gypsy moth larval migration from forest to field and gardens in the Kursk Region in 1927. Zashchita rasteniy. (3-4):370-371.
-- Gypsy moth outbreaks were observed in the Kursk Province from 1925 to 1927. In some areas, larvae migrated to gardens and fields and up to 1000 ha of the forest were infested. Oak, linden, aspen, birch, and Weymouth pine were defoliated. Aspen, elm, hazel, and wild pear were not attacked. Pupation often occurred on nonfavored species. Larvae pupated not only in shelters but also on leaves. When migrating to the fields, they attacked wheat and clover, but oats and rye were not injured. Entomophages caused the death of up to 50 % of insects.
ECentral; HOST PLANTS, PUPAE

222 Bublik, I.M. 1959.
Role of insect pests in lowering productivity of orchards in the Lvov Region. In: IV s"yezd Vsesoyuznogo entomologicheskogo obshchestva. Tezisy dokladaov. Nauka, Moscow and Leningrad: 11-12.
-- The gypsy moth is mentioned among 20 of the most serious phyllophagous pests of Lvov Province. Outbreaks of the pest are mostly local and large-scale outbreaks are rare.
EWest; PEST LIST

223 Bublik, I.M. 1970.
Comparative characteristic of entomofauna of garden pest in the western areas of the Ukrainian SSR. In: Materialy 4 nauchnoy konferentsii zoologov pedinstitutov. Gorki: 170-171.
-- In the area west of the Ukraine, more than 200 pests of fruit plants are recorded. The gypsy moth is one of 5 major pests referred to as belonging to polytrophic phyllophagous lepidopterous species.
EWest; PEST LIST

224 Buda, V.G., Karalyus V.A. 1983.
Effect of larval density on imago behavior during pheromone excretion in *Ephestia kuenhniella*, *Lymantria dispar*, *Yponomeuta cagnaellus* (Insecta: Lepidoptera). In: Materialy 3 Vsesoyuznoy konferentsii po povedeniyu zhivotnykh. Nauka, Moscow: 15-16.
EWest; DENSITY, PHEROMONES

225 Budko, L.A., Lyashenko, K.K., Matrosov, V.V.,

Sharonova, S.V. 1982.
Study of effect of some factors on gypsy moth development. In: Ekologiya i okhrana zhivotnykh. Kuybyshev: 63-70.
-- A study was made to determine the effect of daylength and temperature on larval and pupal development, as well as the effect of temperature and duration of cooling on diapausing gypsy moth. The rate of larval and pupal development normally depends on temperature. Photoperiodic conditions of maintenance do not affect the duration of larval development, but they determine the dates of different instars and the increase in pupal weight. The optimum temperature for egg reactivation is 0° to 6° C. Subzero temperatures are unfavorable for reactivation. Cooling, which is required for normal reactivation of gypsy moth eggs, should last about 1.5 months.
ECentral; DIAPAUSE, PHOTOPERIOD, TEMPERATURE

226 Bukovskiy, V. 1940.
Invertebrate populations, mainly oak defoliators, in the Crimean State Preserve. In: Trudy Krymskogo gosudarstvennogo zapovednika. Simferopol: 39-169.
-- The main types of oak forests in the Crimean Preserve, climatic peculiarities, and insects inhabiting oak foliage recorded from surveys made in 12 sites are described. Data on seasonal dynamics of major inhabitants of Crimean oaks (observed in 3 sites) and their mortality and composition of entomophages also are given. One of the major oak pests is the gypsy moth. Distribution of larvae of this species over Crimean oak forests is reported for the period 1932 to 1935. Gypsy moth mortality caused by parasites ranged from 13.4% to 71.5% in different sites, with an average of about 55%. Dominant species were *Phorocera silvestris* R.D. (from 3% to 30%), *Sturmia scutellata* (up to 5% in one site), species of the genus *Apanteles* (from 8% to 36%), and mermethids. The secondary parasites *Mesochorus fasciatus* Bridam and *Habrocytus metallifemus* were extracted from cocoons of *Apanteles*. Biotic factors are the main cause of outbreak collapse.
EWest; NEMATODES, PARASITES, PEST LIST, PHENOLOGY

227 Burdaeva, T.S. 1981.
Pests and diseases in forest shelter belts. Zashchita rasteniy. (7):33.
-- Investigations were made in Oryol Province. Application of entobacterin and dendrobacillin against phyllophagous pests is suggested.
ECentral; BACTERIA, MICROBIAL PESTICIDES

228 Chankina, O.V., Kutsenogiy, K.P. 1981.
Effect of the size of aerosol particles on the efficacy of insecticides in controlling gypsy moth larvae. In: Nadzor za vreditelyami i boleznyami lesa i sovershenstvovaniye mer bor'by s nimi. Tezisy dokladov. VNIILM, Moscow: 206-207.
-- An experiment was conducted to estimate efficiency of deposition of insecticide aerosol particles ranging from 1 to 6 microns on gypsy moth I-IV instars. The stream velocity ranged from 0.5 to 3 m/sec. An enantiomer of Gexachlorane dissolved in diesel fuel was used. The LD_{50} was found to be independent of the part of the solution from which contamination occurred - the bulk or the surface - and the instar. It was related to the origin of insects and ranged from 2 to 20 mkg/g. An effective cross-section of drop diameter on captured larvae was determined. This value and the value of concentration impulse determined the optimum size of particles. For the gypsy moth this is estimated to be 5 to 15 microns, depending on weather conditions.
WSiberia; CHEMICAL INSECTICIDES

229 Chapek, M. 1985.
Reference list of the braconids (Hymenoptera: Braconidae), parasites of the gypsy moth. Informatsionnyy byulleten' VPS MOBB. 10:32-37.
-- Data are given on 8 braconid species that are active parasites of the gypsy moth. An additional 20 species are listed that are regarded as parasites of this pest in the literature, but have a broader host range.
EWest; PARASITES

230 Chekanov, M.I. 1975.
Gypsy moth in Moldavia. In: Lesomelioratsiya i zashchitnoye lesorazvedeniye v Moldavii. Shtiiintsa, Kishinev: 54-57.
-- Data are given on gypsy moth biology, quantitative and qualitative parameters of the population under study at different gradation phases, and the role of parasites and predators. Twenty entomophagous insect species and one nematode species are mentioned, and data on infestation rate are presented.
EWest; PARASITES, POPULATION FLUCTUATION, PREDATORS

231 Chekanov, M.I. 1976.
The role of entomophages in oak shrinkage in the forest-steppe areas of Moldavia. In: Lesovodstvo i agrolesomelioratsiya v Moldavii. Shtiiintsa, Kishinev: 41-46.
-- Two defoliations of light oak shrubwoods by the gypsy moth together with other factors affecting stands before and after defoliation lead to rapid death of the majority of English oaks. Anthropogenic factors are regarded as the main cause.
EWest; TREE HEALTH

232 Chekanov, M.I., Osetsimskyi, B.I. 1982.
A method to inventory gypsy moth numbers in the oak groves of Moldavia. In: Lesnoye khozyaystvo Moldavii. Shtiiintsa, Kishinev: 74-85.
-- On the basis of gypsy moth distribution in oak groves of Moldavia, two plans of sequential inventories of pest population have been worked out: one for research work and one for practical needs. Application of these methods allows for exact numerical estimates of pest populations in the stands, saving labor and time.
EWest; EGG MASSES, SAMPLING

233 Chelyaev, S.D., Fidosov, N.I. 1989.
The use of bacterial preparations for controlling gypsy moth numbers in its foci. In: Biologicheskiye i tekhnologicheskiye problemy sozdaniya virusnykh preparatov dlya integrirovannoy zashchity rasteniy.

Novosisbisrk: 69.
-- In the Osh region of Kirgizia, experiments were conducted to improve application technology of the virus of the gypsy moth and the bacterial preparation, crystalline-3. Treatments were made with an aerosol generator (AG-UD-2), and a hand sprayer ("Mini-Ulva"). Pistachio plantations were treated against II and III instar gypsy moth. The expenditure rate of crystalline-3 was reduced to 0.5 kg/ha vs 1.0-1.5 kg/ha (a current standard); biological efficiency was 70% to 90%. Application of virin-ENSh against instar III gypsy moth decreased populations by 60% to 100%. A month later, the population recovered and late instars infested plants; defoliation was 10% to 20% in the crown and 60% to 100% in the control.
MAsia; BACTERIA, MICROBIAL PESTICIDES, VIRUS

234 Chelysheva, L.P., Chelyshev, D.E. 1988.
The role of baculovirus in gypsy moth population dynamics in the Far East region. In: Neparnyy shelkopryad: itogi i perspektivy issledovaniy. Institut lesa i drevesiny SO AN SSSR, Krasnoyarsk: 42-43.
-- Epizootiology of virus diseases was studied in gypsy moth gradation foci of Far East populations from 1966 to 1986. Pest outbreaks were recorded in different hardwood and larch stands during 1963 to 1967, 1973 to 1976, and, 1978 to 1984, and occurred in the same stands every 6 to 8 years. Virus disease was the strongest regulating factor, killing 50% to 86% of insects in the foci. In complex foci not only the gypsy moth, but also 9 other lepidopterous species (principally geometrids) died of polyhedrosis. Gypsy moth gradations in all types of foci were terminated by virus epizootics in the second year after a population increase during the later instars. High pest mortality caused by biotic factors such as pathogenic microorganisms and entomophages makes eradication measures unnecessary. Forecasting baculovirus activity must become the basis of integrated pest control.
Far East; OUTBREAKS, VIRUS

235 Chelysheva, L.P., Orlov, J.M. 1986.
Outbreaks of the pink gypsy moth and the gypsy moth in Primorye. In: Trudy Dal'nevostochnogo NII lesnogo khozyaystva. Dal'NIILKh, Khabarovsk: 125-129.
-- Data on biology, distribution, and host plants of Lymantria mathura Moore in the Russian Far East, with some data on diseases of this species and the gypsy moth, are presented.
Far East; GENERAL BIOLOGY, HOST PLANTS

236 Cherbanik, D.D. 1970.
Effect of pseudoallicin-374 on the development of gonads and fecundity in the gypsy moth (*Porthetria dispar* L.). In: Naukovi pratsi USGA. USGA, Kiev: 57-68.
-- Effect of pseudoallicin-374 at a concentration of 1:600 was tested on gypsy moth larvae. It was discovered that pseudoallicin-374 inhibits development of gonads and reduces fecundity.
EWest; GROWTH REGULATORS

237 Cherepanov, A.I. 1949.
The most important insect pests of the forests in Tuva and measures for their control. Izvestiya Zapadno-Sibirskogo filiala Akademii nauk SSSR, seriya biologiya. 3(2):15-35.
WSiberia; CONTROL, PEST LIST

238 Cherepanov, A.I. 1956.
Insects in the Tuva Autonomous Republic. In: Trudy Biologicheskogo instituta Zapadno-Sibirskogo filiala AN SSSR. Izd. AN SSSR, Moscow: 35-78.
-- The gypsy moth is recorded as a pest of forests growing along rivers in the forest-steppe zone. It attacks birch, poplar and willow.
WSiberia; HOST PLANTS, PEST LIST

239 Cherepanov, A.I. 1962.
Pest insects and protection of kolki forests in Western Siberia. In: Trudy Sibirskogo otdeleniya AN SSSR. Novosibirsk: 154-161.
-- The gypsy moth is mentioned among pests of kolki forests. It attacks birch and aspen, which are the main species of kolki forests. But the gypsy moth attacks birch heavily only in the foothills of Altai. In the plain regions, tortricids, sawflies, and scarabids are more important pests, while the most serious pest of aspen is the satin moth.
WSiberia; HOST PLANTS, PEST LIST

240 Cherepenko, Ye.I., Martynenko, Ye.I., Bubenchikova, S.N., Galkin, A.P. 1986.
Gypsy moth, *Porthetria dispar*, cellular and nuclear polyhedrosis virus DNA methylation. Molekulyarnaya genetika, mikrobiologiya i virusologiya. 8:40-43.
EWest; VIRUS

241 Cherepenko, Ye.I., Martynenko, Ye.I., Kok, I.P. 1984.
Physiochemical characteristics of DNA of *Porthetria dispar* nuclear polyhedrosis virus. Ukrainskiy biokhimicheskiy zhurnal. 56:614-619.
EWest; PHYSIOLOGY, VIRUS

242 Chernichuk, L.L. 1987.
Determination of synthetic gypsy moth sex pheromone concentration in the air. In: Novyye metody v zashchite rasteniy. Shtiintsa, Kishinev: 81-89.
-- Disparlure content in the air of forest plots was estimated during an experiment on sex disorientation of the gypsy moth. To saturate the atmosphere, rubber crumbs (disparlure dissolved in organic solvent), and a new water-based preparation were used. After the plots had been treated with liquid preparations at a dose of 100 g per ha, pheromone concentration in the air did not exceed 3 mkg/cbm during the first 24 hours.
EWest; MATING DISRUPTION

243 Chernichuk, L.L., Bednyy, V.D. 1985.
Characteristics of preparations of disparlure in relation to volatility. In: Novyye metody v zashchite rasteniy. Shtiintsa, Kishinev: 46-53.
-- Preparations of disparlure used for forecasting gypsy moth and nun moth populations are classified by volatility (concentration of equilibrium vapor). A relationship is established of disparlure volatility to the attractant dose of

the form, type of the base material, and ambient temperature.
EWest; PHEROMONES

244 Chernichuk, L.L., Dron', L.P., Vaintrub, F.P. 1987. **A technique for estimating disparlure in soil.** In: Novyye metody v zashchite rasteniy. Shtiintsa, Kishinev: 77-80.
-- A technique for estimating disparlure content in forest soil is described: This technique includes soil extraction with acetone, transfer of disparlure from the extract to a hydrophobic solvent (n-hexane), concentration and purification of the hexane extract by chromotography on an alumina column, concentration of eluate extracted from the column, and quantification of disparlure by gas-liquid chromatography.
EWest; PHEROMONES, SOIL

245 Chernikova, O.I., Tur'yanov, R.A. 1984. **Estimation of efficacy of hormonal preparations of altozar and altozid against the gypsy moth.** In: Nauchno-tekhnicheskoye tvorchestvo molodykh uchyenykh - lesnomu khozyaystvu. Materialy VII nauchnoy konferentsii aspirantov i nauchnykh sotrudnikov VNII lesovodstva i mekhanizatsii lesnogo khozyaystva. VNIILM, Pushkino: 217-221.
-- Gypsy moth larvae are not sensitive to synthetic analogues of the juvenile hormones altozar and altozid until they reach the last instar, when there are two peaks of sensitivity. The preparations tested remain active for a long time under natural conditions, but they cannot be retained in the organisms of larvae and, therefore, are not harmful to the gypsy moth even in the sensitive period.
ECentral; BIOASSAY, GROWTH REGULATORS

246 Chernikova, O.P., Tur'yanov, R.A. 1983. **Susceptibility of gypsy moth larvae to a synthetic analogue of the juvenile hormone, altozar.** In: Molodyye uchenyye k yubileyu instituta. Trudy nauchnoy konferentsii aspirantov i nauchnykh sotrudnikov VNII lesovodstva i mekhanizatsii lesnogo khozyaystva Gosleskhoza SSSR. VNIILM, Pushkino: 232-236.
-- The action of altozar on gypsy moth instars II and III was studied. Aqueous emulsions of increasing preparation concentrations (0.00001-0.1%) were sprayed on birch leaves that were then fed to larvae. No toxic effect on larvae was observed. A weak morphogenetic effect was seen in two cases: when larvae were reared on altozar-treated food for a long time, and when larvae were treated before molting to the fourth instar.
EEast; BIOASSAY, ENDOCRINOLOGY, GROWTH REGULATORS

247 Chernyavskaya, O.A., Devet'yarova, S.V., Zhimerikin, V.N., Bakhvalov, S.A. 1979. **Introduction of a polyhedrosis in different gypsy moth populations under the influence of suboptimal factors.** In: Entomopatogennyye mikroorganizmy v lesnykh biotsenozakh. Institut lesa i drevesiny SO AN SSSR, Krasnoyarsk: 91-97.
WSiberia; MICROBIAL PESTICIDES, VIRUS

248 Chernyshev, N. 1906. **Protection of gardens against insect pests and diseases.** Plodovodstvo. 4:331-338.
-- The gypsy moth is mentioned among important orchard pests. The following control measures are suggested: spraying trees with Paris green, using kerosene emulsion, and daubing trees with lime milk. Dates of treatments against pests and diseases are suggested.
ECentral; CHEMICAL INSECTICIDES

249 Chervenkov, S. 1984. **Micromechanic determinations of small biological objects.** In: Nauchnyye trudy Vysshego instituta zootekhniki i veterinarnoy meditsiny. Zagora: 103-110.
-- The hardness of gypsy moth chorion was tested using the microhardness gauge PMT-3. Mean egg diameter was determined by 100 measurements. Experiments on testing microhardness of egg chorion in different directions are described. The following metric parameters were measured: mean egg diameter, surface area, and mean volume. Differences found in chorion hardness in different directions towards the spherical chorion surface may be related to differences in chorion structure. Relation of chorion microhardness to the type of contents is studied.
ECentral; EGGS, MORPHOMETRICS

250 Chistyakov, Yu.A. 1984. **Distribution of higher nocturnal lepidopterans from the subfamilies Bombycoidea, Notodontoidea and some Noctuoidea in main forest formations of the southern Primorye.** In: Fauna i ekologiya bespozvonochnykh Dal'nego Vostoka: vrediteli i entomofagi. DNTs AN SSSR, Vladivostok: 80-99.
-- The author presents a list of 173 nocturnal lepidopterous species of the families Bombycidae, Brahmaeidae, Endromidae, Saturniidae, Lasiocampidae, Sphingidae, Notodontidae, and Lymantriidae registered in the southern Primorye. The gypsy moth is a common species in the region. Generalized data are given on distribution by stations, trophic relations and the role of lepidopterous insects in question in basic forest formations. Palearctic lepidopterous insects are shown to prevail in all forest types.
Far East; DISTRIBUTION, FAUNAL LIST

251 Chkhubianishvili, N.A., Kiziryan, N.G. 1990. **Gypsy moth entomophages in Georgia.** Soobshcheniya Akademii nauk Gruzinskoy SSR. 138(1):161-164.
-- In 1988-1989, an epizootic of a nuclear polyhedrosis virus was recorded in gypsy moth population. Also recorded in the pest population were parasitic nematodes of the family Mermithidae of the genus *Isomermis*. Both the virus and nematodes are regarded as promising agents for gypsy moth control.
Caucasus; NEMATODES, VIRUS

252 Chugunin, Ya.V. 1949. **Focal periodicity gypsy moth mass propagations.** Zoologicheskiy zhurnal. 28(5):431-438.
-- Data on gypsy moth outbreaks are given for the period from 1931 to 1948. It is pointed out that during this period no uniform infestation of vast forest areas was recorded and pest distribution is always spotty in foci. The author

believes that, after hatching, all larvae migrate until they molt to the second instar. Origination of foci seems to depend only on weather conditions and peculiarities favoring concentration of migrating first instars in certain areas where secondary foci are formed. It is the author's opinion that larvae remaining in primary foci are doomed to die. The outbreak lasts three years and collapses in the fourth. A complete cycle of population dynamics in the Crimea lasts nine years. Foci of high density always originate in the same places, areas of air-pockets and turbulence. It is suggested that conifers be planted in such plots, thus depriving the pest of food in aggregation sites.
EWest; DISPERSAL, FOCI, OUTBREAKS, SILVICULTURAL TREATMENTS, WEATHER

253 Chugunin, Ya.V. 1951.
Outbreak coincidence of different folivorous larvae. Zoologicheskiy zhurnal. 30(1):63-65.
-- Outbreaks of phyllophagous insects, including gypsy moth, usually occur simultaneously, but foci of each species occupy a separate area and it is only in the process of expansion or redistribution that they can merge and overlap. In the site where outbreak of one phytophage has occurred, there will not be an outbreak of another phyllophage as agents of diseases are the same for all coincident insect species. Polyhedrosis virus is the main factor suppressing outbreaks. In high density foci, pests as well as ants and carabids disappeared. Gypsy moth foci originate only through dispersal of first-instar larvae from hatching sites.
EWest; DISPERSAL, FOCI, POPULATION DYNAMICS, VIRUS

254 Chugunin, Ya.V. 1958.
The gypsy moth. (Neparnyy shelkopryad.) Cel'khozgiz, Moscow. 36 p.
-- Data on gypsy moth outbreaks in the Crimea are given. It is the author's opinion that origination of foci and outbreak collapse are related to the following behavioral traits of gypsy moth larvae: total migration of first-instar larvae and concentration in the points of air turbulence, and the death of insects caused by virus epizootics three years after the onset of outbreak.
EWest; DISPERSAL, POPULATION DYNAMICS

255 Chukhriy, M.G. 1982.
Ultrastructure of viruses of lepidopterous pests. Illustrated handbook. (Ul'trastruktura virusov cheshuekrylykh - vrediteley rastenyy. Illyustrirovannyy opredelitel'.) Shtiintsa, Kishinev. 150 p.
-- Nuclear polyhedrosis and granulosis viruses were studied in 16 lepidopterous species, including the gypsy moth. A lot of unique electromicrograms, which provide an idea of the baculoviruses and nuclear polyhedrosis viruses of insects studied, are presented.
EWest; MORPHOLOGY, VIRUS

256 Chukhriy, M.G. 1987.
Identification of viruses of insect pests and estimation of efficacy of virus preparations. Avtoreferat dissertatsii doktora biologicheskikh nauk. Leningrad. 29 p.
-- The author studied the ultrastructure and the complete morphogenesis cycle of nuclear polyhedrosis viruses of the most serious agricultural pests, including the gypsy moth, from five populations, which served as a basis for new virus preparations. By electron microscopy and mathematical simulation, an express method was developed for estimating the qualities of preparations of virin-ENSh, virin-X and virin ABB.
ECentral; PHYSIOLOGY, VIRUS

257 Chuvakhin, V.S., Mushnikova, K.S., Pastukhov, B.N., Popov, S.D., Gerasimov, B.A., Zaring, P.V. 1945.
The gypsy moth. In: Posobiye po bor'be s vreditelyami i boleznyami sel'skokhozyaystvennykh kul'tur. OGIZ-Sel'khozgiz, Moscow: 436-437.
-- Data are given on gypsy moth area, biology, and phenology. Control measures suggested include treatment with petroleum, scraping off egg masses, and application of insecticides.
ECentral; CONTROL, GENERAL BIOLOGY

258 Chzhou, Khou-An 1960.
Regularities of changes in susceptibility of lepidopterous pests to chloro-organic insecticides and ways they overcome them. Avtoreferat dissertatsii kandidata sel'skokhozyaistvennykh nauk. Leningrad. 17 p.
-- The gypsy moth is one of 10 model lepidopterous species. It was found that when larvae are treated with sublethal doses of organic chloride insecticides, insects develop resistance as early as the first generation. Resistance of larvae and adults is inversely related to the ambient temperature after treatment. Better feeding conditions resulting in better physiological parameters of insects make them more resistant to organic chloride pesticides. A conclusion is made that alternate application of these pesticides does not prevent insect populations from developing resistance to this group of preparations.
ECentral; CHEMICAL INSECTICIDES, GENETICS, NUTRITION

259 Chzhu, Khayi-Tsin 1961.
The effect of a parasite on gypsy moth organs and tissues. Avtoreferat dissertatsii kandidata biologicheskikh nauk. Moscow. 16 p.
-- The effect of the braconid, *Apanteles solitarius*, on the host organism was studied. The parasite larva causes significant disruption of all systems and organs of host larva by squeezing internal organs. As a result, a host larva consumes less food, and its growth is inhibited. The host is mortally injured when the parasite emerges after completing its development. Death of the host results from the summary action of the parasite. All life stages of the parasite are described.
ECentral; MORPHOLOGY, PARASITES

260 Chzhu, Khayi-Tsin 1962.
Ontogenesis and biology of *Apanteles solitarius* Ratz., a parasite of the gypsy moth (*Porthetria dispar* L.). Vestnik Moskovskogo universiteta, seriya VI, biologiya, pochvovedeneie. 6:26-32.
-- Data are presented on morphology of all preimaginal stages of the parasite (egg, instars I-III, prepupa, pupa). The first instar is described in detail. The process of oviposition, larval competition inside the host, and

fecundity are discussed.
ECentral; DEVELOPMENT, MORPHOLOGY, PARASITES

261 Chzhu, Khayi-Tsin 1965.
The effect of *Apanteles solitarius* larvae on the midgut of the gypsy moth (*Porthetria dispar* L.). Vestnik Moskovskogo universiteta, seriya VI, biologiya, pochvovedeneie. (4):34-37.
-- When early instars of gypsy moth are attacked by parasites of the genus *Apanteles*, the host's internal organs (digestive organs and circulatory system) are squeezed. As the larva grows, this effect becomes more pronounced. Flattening of the crop and mid-intestine results in reduction in the amount of food that passes through the intestine and, consequently, inhibits growth. Disruption of intestine functioning affects the condition of all tissues and organs. When the parasite larva emerges, the host is badly injured and the host dies.
ECentral; PARASITES, PHYSIOLOGY

262 Danil'chenko, A.O. 1925.
Gypsy moth and its control. In: Kiivs'ka stentsiya zakhistu roslin vid shkidnikiv. Kiev: 1-4.
-- The following general data on gypsy moth and control measures are presented: collection of egg masses and treatment with petroleum, treatment with Paris green, and belt traps.
EWest; CONTROL

263 Degtyareva, V.I. 1964.
Gypsy moth. In: Glavneishiye vrednyye cheshuekrylyye drevesno-kustarnikovoy rastitel'nosti tsentral'noy chasti Gissarskogo khrebta i Gissarskoy doliny (Lepidoptera). Izdatelstvo AN Tadzhikskoy SSR, Dushanbe: 41-48.
-- The paper presents general data on gypsy moth ecology, area, parasites, economic significance, and control measures. In Tadjikistan, the gypsy moth flies from late June to late August. Summer in Kondar (an altitude of 1,100 m) is at its peak in July. Males fly around the clock and are attracted by light, but females are very rarely attracted by light. Egg masses could be found on tree trunks, walls, and sometimes as high as under the roof. The size of an egg mass is 280 to 378 eggs. Hatching starts at a temperature no lower than 10°C. In nature, hatching is prolonged, occurring from April to early May. Pupation begins in early June and pupae are found under loose bark, in the tree hollows, in the litter, and under stones. In Turkmenistan, the gypsy moth inhabits broad-leaved forests on northern slopes and at the bottom of canyons at an altitude of 1,000 to 2,100 m. In Middle Asia, as a whole, the gypsy moth is an outbreak species in all the regions with hardwoods and in thickets of willow and elm. *Apanteles tetricus* Beinh. [misidentification?], *Anastatus disparis* Rsch., and a tachinid complex are mentioned as parasites.
MAsia; EGG HATCH, FLIGHT, LIGHT TRAPS, MALES, PARASITES, PUPAE, SITE CONDITIONS

264 Degtyareva, V.I. 1971.
The most promising ichneumonid wasps parasitizing preimaginal-instars of lepidopterans in Tadjikistan. In: Zashchita lesa ot vrednykh nasekomykh i bolezney. Vsesoyuznaya nauchno-tekhnicheskaya konferentsiya. Doklady. Moskva: 39-40.
-- In central Tadjikistan, dendrophilous lepidopetrans are parasitized by 30 ichneumonid species, 41 braconid species, 22 chalcid species, as well as tachinids and nematodes of the mermithid family. The author believes *Apanteles teticus* Beinh. [misidentified?] to be one of the most promising braconid species, parasitizing early instar gypsy moth on a large scale.
MAsia; PARASITES

265 Dekhtyarev, N.S. 1928.
Insect pests in the Ukraine from 1926-1927. Zakhyst roslin. [1928]:14-25.
-- Two hundred thirty-eight insects, which were important pests in the Ukraine during the given period, are listed; 66 lepidopterous species are included. The gypsy moth was a serious pest of orchards, parks, and forests. Old oak and elm forests were often completely defoliated. Sometimes trunks were densely covered with egg masses, which were often deposited at heights 3 m and above.
EWest; GENERAL BIOLOGY, OVIPOSITION SITE, PEST LIST

266 Dekhtyarev, N.S. 1928.
The gypsy moth (*Porthetria dispar* L.). In: Shkidlivi komakhi sadu. Kharkov: 98-101.
-- Gypsy moth life stages, biology and its harmful effect are described in brief. The following control measures in orchards are suggested: egg mass collection and treatment with petroleum, application of sticky belts, and treatment with insecticides.
EWest; CONTROL, GENERAL BIOLOGY

267 Dem'yanov, L. 1909.
Pest control in the gardens in spring. Sadovodstvo. [1909]:46-50.
-- The gypsy moth is regarded as a major orchard pest. Imago, egg mass and larva are described. Egg mass collection and destruction or treatment with petroleum and application of sticky belts are suggested as control measures. After larvae migrate to the crown, treatment with Paris green or arsenic preparations is suggested.
ECentral; GENERAL BIOLOGY

268 Denisova, S.I., Romenko, T.M. 1988.
Gypsy moth response to the physiological state of a food plant in Belorussia. In: Neparnyy shelkopryad: itogi i perspektivy issledovaniy. Institut lesa i drevesiny SO AN SSSR, Krasnoyarsk: 10.
-- Gypsy moth larvae were fed on apple and birch leaves that were 15% to 20% defoliated by phyllophages. Controls were placed on undamaged trees to feed. Biochemical composition of leaves of damaged and undamaged trees (water, lipids, soluble carbohydrates, protein nitrogen, and carbohydrate-protein ratio) was determined. The effectiveness of food utilization, nitrogen utilization coefficient, and metabolism intensity of the gypsy moth also were determined. Larval metabolism intensity was found to depend both on food plant species and its physiological condition. This factor was higher for gypsy moth that fed on apple than for those that fed on birch. Gypsy moth food plants that were injured 15% to

20% result in a higher leaf content of nitrogenous compounds, soluble carbohydrates, and a better carbohydrate-protein ratio, which is favorable for growth and development of the pest.
ECentral; ENERGETICS, FOLIAGE CHEMISTRY, NUTRITION

269 Derevaynko, N.M., Dey, Ye.A. 1981.
The phenotypic structure of gypsy moth larvae (*Porthetria dispar* L.) in Low Dnieper region. In: Ekologo-morphologicheskiye osobennosti zhivotnykh i sreda ikh obitaniya. Naukova Dumka, Kiev: 97-98.
-- The ratio of "black" and "grey" phenoforms of gypsy moth larvae in the population is established at different gradation phases. The nature of inheritance of larval coloration characteristics is considered in connection with homo- and heterozygosis.
EWEST; COLOR POLYMORPHISM

270 Derevyanko, N.M. 1977.
The study of structural and functional patterns of gypsy moth populations in Low Pridneprovye. In: Ekologo-fiziologicheskiye issledovaniya v prirode i eksperimente. Materialy V Vsesoyuznoy konferentsii. Ilim, Frunze: 109-110.
-- Gypsy moth specimens feeding on different food plants were taken from different micropopulations to study polymorphism of soluble proteins in the gypsy moth hemolymph. Protein polymorphism was found to be related to the food plant favored by larval coloration, as well as to the population gradation phase. The data obtained are discussed in terms of studying intrapopulation variation and population structure.
EWest; BIOCHEMISTRY, COLOR POLYMORPHISM, HOST PLANTS

271 Derevyanko, N.M. 1980.
Development pattern of gypsy moth eggs in the spring as a factor of ecological plasticity of its population in the conditions of Low Pridneprovye. Vestnik zoologii. (4):70-74.
-- In the Lower Dnieper region, three gypsy moth populations were distinguished: those inhabiting oak groves, willow thickets, and bastard acacia stands. Field surveys showed hatching in each population coincided with the foliation of the main forest-forming species favored by the larvae as a food plant. Larvae inhabiting willow stands are the first to hatch; 5-7 days later, hatching occurs in oak groves, and 10-12 days later on bastard acacia. The same rhythm is observed under laboratory conditions when egg masses are kept at an equal temperature. The method of disc-electrophoresis in polyacrylamide gel was used to establish differences in dynamics of soluble protein ratio changes in gypsy moth eggs during their spring postdiapause development. A conclusion is made that genetics plays a role in the insect's adaptation to the conditions of different forest communities and in feeding on different food plants.
EWest; EGG HATCH, GENETICS, HOST PLANTS

272 Derevyanko, N.M. 1980.
Protein polymorphism in the gypsy moth relative to a population phenostructure. In: Rol' dendrophil'nykh nasekomykh v tayezhnykh ekosistemakh. Tezisy dokladov Vsesoyuznoy konferentsii, Divnogorsk, 1980. Institut Lesa i Drevesiny SO AN SSSR, Krasnoyarsk: 42-43.
-- Grey gypsy moth larvae are homozygous while larvae with a black stripe are, as a rule, heterozygous. In the eruption phase of an outbreak, the ratio of grey larvae to those with a black stripe is found to be 92.5:7.5; in the crisis phase it is 98:2.
EWest: COLOR POLYMORPHISM, POPULATION DYNAMICS

273 Derevyanko, N.M. 1988.
Phenotypic variety of gypsy moth populations in various landscape and climatic zones of the USSR. In: Neparnyy shelkopryad: itogi i perspektivy issledovaniy. Institut lesa i drevesiny SO AN SSSR, Krasnoyarsk: 11.
-- Phenotypic variety of larval coloration in different populations was studied in the Crimea, the Carpathian region, Voronezh Province, the Lower Dnieper region, and the Krasnoyarsk and Khabarovsk Krais. In the European part of the USSR, three types of gypsy moth larval coloration were detected: grey, black and red. Phenotype ratio is different at different population gradation phases. At all the gradation phases, grey insects prevail, with the portion of black ones ranging from 2 to 7.5%; red larvae usually die at the larval stage. In the Khabarovsk population, red insects comprise 99-99.55% and grey 0.5-1.0%; black ones were not found. A balanced ratio of phenotypes in populations accounts for their phenostructure the function of which, based on the frequency of occurrence of homo- and heterozygotes in mating, amounts to qualitative changes in the population condition. Different proportions of phenotypes in different geographical populations suggests that insects of different phenotypes should be of different selective importance for the population depending on its environmental conditions.
EWest; COLOR POLYMORPHISM, GENETICS

274 Derevyanko, N.M., Kolybin, V.A. 1983.
Some structural and functional patterns of the gypsy moth population in Low Pridneprovye based on the study of polymorphism. In: 5 zoologicheskaya konferentsiya: Biologicheskiye osnovy osvoeniya, rekonstruktsii i okhrany zhivotnogo mira Belorussii. Nauka i tekhnika, Minsk: 46-47.
-- Comparative disc-electrophoretic analysis of gypsy moth hemolymph proteins was made at some stages of ontogeny and in relation to peculiarities of population structure. At different life stages of the gypsy moth and the oak population, the number of protein fractions was found to range from 9 to 19; differences in the number of protein fractions also were detected in the insects of different micropopulations. The identity coefficient of the larvae of oak and willow micropopulations was 0.9, of oak and acacia, 0.29, and of willow and acacia 0.32. A conclusion can be made that in the Lower Dnieper region adaptation of micropopulations to major food plants is accompanied by biochemical changes in the insects.
EWest; BIOCHEMISTRY, HOST PLANTS

275 Derevyanko, N.M., Kolybin, V.A., Shumova, T.Ye.1985.
Ecological and biochemical patterns of gypsy moth

populations from various geographic zones of the USSR. In: Sistema monitoringa v zashchite lesa. Tezisy dokladov Vsesoyuznogo soveshchaniya. Institut lesa i drevesiny SO AS SSSR, Krasnoyarsk: 173-174.
-- Based on ecological and biochemical parameters, differences characterizing each of the gypsy moth populations under study were detected and the degree of adaptability of specific populations to their environment was established.
EWest; GEOGRAPHIC VARIATION

276 Dey, Ye.A. 1980.
Comparative ecological analysis of the emperor moth and gypsy moth. In: Issledovaniya po entomologii i akarologii na Ukraine. Tezisy dokladov 2-go s"yezda UEO, Uzhgorod 1980. Kiev: 91-92.
-- Comparison of ecological characteristics of the saturian, Eudia parvonia L., and the gypsy moth was made using the following parameters: sex ratio, ability of males to fertilize several females, duration of diel activity and imago fecundity, range of food specialization of larvae and frequency of occurrence of their food plants, mobility of larvae, and their ability to live without food. These do not favor *Eudia pavonia*. Thus, a stable, low population level of this species, included in the Red Book of the Ukraine, is due to a complex of its peculiarities that prevent it from winning when competing with other phyllophagous insects.
EWest; GENERAL BIOLOGY

277 Dey, Ye.A., Nikitenko, G.N. 1980.
Predators and symbions of the gypsy moth (*Porthetria dispar* L.) (Lepidoptera) in the Lower Dnieper Region. Vestnik zoologii. (3):91-92.
-- *Bdlella* sp. (Bdellidae, Trombidiformes) are egg parasites. Trombididae and *Protolaepas bickizi* (Aceosjidae, Gamasina) are larval parasites. *Androleapes casalis* (Laelaptidae, Gamasina) parasitizes pupae, while *Metabelta* sp. (Oribatei, Sarcoptiformes), *Trichoribates trimaculatus* (Oribatei Sarcoptiformes) are found in egg masses and pupae, and Liodes sp. and Eporibatula sp. (Oribatei, Sarcopriformes) are found in egg masses. *Platycleis grisea* F. (Tettigoniidae, Orthoptera) eats adults. *Phynocoris iracundus* Poda attacks migrating larvae and *Nabis apterus* F. (Nabidae, Hemiptera) and *Chrysopa* sp. (Chrysopidae, Neuroptera) attack early instars. *Formica pratensis* Retz. (Formicidae, Hymenoptera) attacks adults.
EWest; PREDATORS

278 Dey, Ye.A., Nikitenko, G.N. 1980.
Occasional symbionts and predators of the gypsy moth in Low Pridneprovye. Vestnik zoologii. (3):91-92.
-- Surveys and collections were made in 1976-1978 during a gypsy moth outbreak. Thirteen arthropod species were found to form short-term associations with the pest at different life stages: 8 species of mites (*Bdella* sp., *Protolaelaps bickeji*, *Androlealeps casalis*, *Matabella* sp., *Trichoribates trimaculatus*, *Liodes* sp., *Eporibatula* sp., and the Trombidibae family), and 5 insect species (*Platycleis grisea*, *Rhynocoris iracundus*, *Nabis apterus*, *Chrysopa* sp., and *Formica pratensis*). Associations of saprophytic and carnivorous arthropods with the gypsy moth are most often formed during a period of high gypsy moth numbers, but if the ecological situation in a specific biocenosis changes, some secondary entomophages can easily become primary ones.
EWest; PREDATORS

279 Dey, Ye.A., Nikitenko, G.N. 1980.
Distribution of gypsy moth egg masses in Low Pridneprovye. In: Issledovaniya po entomologii i akarologii na Ukraine. Tezisy dokladov 2-go s"yezda UEO, Uzhgorod 1980. Kiev: 90.
-- To detect fluctuations of gypsy moth populations in time to suggest control measures, annual counts of egg masses in gypsy moth habitats are needed. Surveys were made in Kherson and Nikolaev Provinces. Analysis of the data obtained showed that in the Lower Dnieper Region, at any gradation phase, gypsy moth females prefer to oviposit on the southern sides of food plants. Over 50% of all egg masses usually are deposited on southeastern, southern, and southwestern sides. Most egg masses are deposited on the trunk at heights up to 50 cm, but in humid stations egg masses are found at a height of more than 1 m. At the outbreak phase, distribution of egg masses varies considerably in height, side, and food plants.
EWest; OVIPOSITION SITE

280 Dey, Ye.A., Nikitenko, G.N. 1981.
Deviations from theoretically expected phenogroup ratios in gypsy moth larvae when released into the field. In: Ekologo-morfologicheskiye osobennosti zhivotnykh i sreda ikh obitaniya. Naukova Dumka, Kiev: 95-96.
-- Egg masses resulting from crosses of adults belonging to "grey" and "black" phenogroups were distributed in oak-birch stands of the Black Sea Preserve. At the larval stage, a decrease in the number of "black" larvae was due to their increased mortality and usually occurs during a period of population decrease.
EWest; COLOR POLYMORPHISM, GENETICS

281 Dikusar, N.S. 1979.
Activity of nuclear polyhedrosis virus in the gypsy moth. In: Mikroorganizmy i virusy. Shtiintsa, Kischinev: 71-74.
-- Investigations were made to detect carriers of a latent nuclear polyhedrosis virus in natural populations of the gypsy moth. Instars I to IV were subjected to cooling at a temperature of + 2-3°C. Cooling lasted from 10 to 96 hours and led to nuclear polyhedrosis being induced. To establish cause of death, hemolymph smears were examined with light and electronic microscopes. Cooling of fourth instars for 96 hours proved to be the most effective. Thirty days after cooling, mortality was 57%.
EWest; HISTOLOGY, TEMPERATURE, VIRUS

282 Dmitrienko, V.K., Dryannykh, N.M., Petrenko, Ye.S. 1975.
After effects of ant - insect larvae interactions. In: Materialy 5 Vsesoyuznogo simpoziuma po ispol'zovaniyu murav'yev v bor'be s vreditelyami lesa. Nauka, Moscow: 26-32.

-- The fate of gypsy moth larvae after being bitten by ants is discussed.
WSiberia; PREDATORS

283 Dmitriev, A.P., Fedorov, I.A. 1981.
Gypsy moth control with virin-ENSh preparation. Lesnoye khozyaystvo. (1):56-57.
-- These are practical recommendations on gypsy moth control with the virus preparation virin-ENSh. It is concluded that the preparation should be produced in batches. The gypsy moth is a serious pest in Orenburg Province. The biggest outbreak in this century was observed in 1977, with a focal area of 123,000 ha.
EEast; MICROBIAL PESTICIDES, VIRUS

284 Dmitriev, P.P. 1981.
Gypsy moth management in the forests of the Orenburg Region. In: Nadzor za vreditelyami i boleznyami lesa i sovershenstvovaniye mer bor`by s nimi. Tezisy dokladov. VNIILM, Moscow: 61-63.
-- In Orenburg Province, forests are represented by flood plain forests and forest "islands" in a forest-steppe, with a total area of 662,000 ha. Because the stands are open, gypsy moth outbreaks are frequent. Since 1967, survey has been made with sex attractants: unfertilized females, their extract, and synthetic disparlure. To capture males, 5 types of glue were applied to the trap surface. It was the glue produced by the "Spodriba" chemical plant (Latvia) that best met the requirements. Traps were checked every second or third day for 30-40 days from early July to early August. No relationship between the number of males captured and stand infestation was found. The author believes that this can be accounted for by males prevailing during periods of outbreak and collapse. Therefore, such a survey can only be useful in foci with increasing numbers. At outbreak and collapse phases, it would be more appropriate to establish the level of infestation using autumn egg mass counts. Thus, surveys using attractants in combination with re-counting and detailed counts of egg masses allow the beginning of an outbreak to be detected more exactly and in proper time for control measures to be outlined.
ECentral; EGG MASSES, PHEROMONE TRAPS, PROGNOSIS, SAMPLING

285 Domnikov, G.V. 1985.
Spatial distribution patterns of outbreaks of folivorous insects in the Central forest-steppe. In: Vos'maya vsesoyuznaya zoogeographicheskaya konferentsiya, Leningrad, 1985. Tezisy dokladov. Moscow: 302-303.
-- In 1971-1983, foci of the green oak leaf roller, the gypsy moth and related species were surveyed in stands of various types - plain and ravine, parkland and closed stands - in the Central Chernozemny Preserve. During this period, phyllophagous insect outbreaks in the Central forest-steppe appeared to be extremely prolonged, which is related to increased anthropogenic impact on forest ecosystems.
ECentral; STAND COMPOSITION

286 Dovnar-Zapolskiy, D.P. 1953.
Oak entomofauna in the European part of the USSR. Avtoreferat dissertatsii kandidata sel'skokhozyaistevennykh nauk. Voronezh. 12 p.
-- The author lists 767 phytophagous species that inhabit oak. Of these, 163 species are of economic significance, and about 10 species are considered the most important, the gypsy moth included. Brief information on ecology, phenology and geographical distribution is given.
ECentral; PEST LIST

287 Dranik, V.A. 1938.
Water impact on gypsy moth egg development. In: Uchenyye zapiski gosudarstvennogo pedagogicheskogo i uchitel'skogo instituta imeni V.V. Kuybysheva. : 47-51.
-- Experiments designed to determine the effect of the duration of flooding on the percentage of gypsy moth hatch and survival showed that a short flooding period (up to 10 days) does not produce a noticeable effect on egg survival and accelerates development of larvae. Therefore, stable pest foci are formed in plavni which must be continuously surveyed by the forest protection service.
ECentral; EGG HATCH, WEATHER

288 Dron, Y.P., Vainrub, F.P. 1980.
Detection of disparlure in biological material. In: Novyye metody v zashchite rasteniy. Shtiintsa, Kishinev: 11-16.
EWest; PHEROMONES

289 Dubko, L.A., Kozlovskaya, N.S., Sivtsova, L.I. 1989.
Some aspects of rearing gypsy moth as a test object. In: Tezisy dokladov 2 Vsesoyuznoy konferentsii po promyshlennomu razvedeniyu nasekomykh. Nauka, Moscow: 84.
-- Eighteen semisynthetic media for rearing the gypsy moth were tested, and a medium containing wheat germ was suggested. This was adapted to food requirements of the gypsy moth and their changes in different instars. A medium for late instars contained an increased content of dry yeast; filter paper was a phage stimulant, corn flour was partially substituted with soya flour, and the amount of water was decreased. A selection of various insect groups and application of microbiological tests seem advisable.
ECentral; NUTRITION, REARING

290 Dzhemilev, U.M., Fakhretdinov, R.N., Telin, A.G., Tolstikov, G.A., Amirkhanov, D.V., Krivonogov, V.P. 1981.
New approach to the synthesis of optically active disparlures, attractants of *Porthetria dispar*. Khimiya prirodnykh soedineniy. 5:650-657.
-- A new, unique method of synthesis of (+) and (-) enantiomers of 2-methyl-Z-7,8-epoxy and 2-methyl E-7,8 epoxyoctadecans gypsy moth attractants was developed, using available 2-methyl 7 Z and 7E-octadecens and molybdenum peroxides as initial compounds.
EEast; PHEROMONES

291 Ebergardt, G.G. 1930.
List of pests and diseases of the vine in Dagestan SSR in 1927 and 1928. Vestnik vinogradosrstva, vinodeliya i vinotorgovli SSSR. (2):762-770.
-- The gypsy moth is mentioned as a pest of grape.

Larvae often were found in vineyards of Dagestan where they had migrated from hardwood species. The damage is insignificant.
MAsia; HOST PLANTS

292 Edel'man, N.M. 1953.
Effect of feeding regime on development of the gypsy moth, *Lymantria dispar* L., and the leaf beetles *Melasoma populi* L. and *M. tremulae* L.
Entomologicheskoye obozrenie. 33(1):36-46.
-- Feeding on different species, even with the same amount of leaf consumption, was found to cause physiological dissimilarities and different survivorship of gypsy moth larvae. Depending on the food plant, three types of metabolism were distinguished: carbohydrate-protein, fat-protein, and fat. Content of lipase tissues, storage substances, total nitrogen and fat, as well as activity of lipase tissues, were estimated. The conclusion was made that the most favorable feeding conditions are on oak, and the least favorable are on birch and poplar.
ECentral; FOLIAGE QUALITY, HOST PLANTS, PHYSIOLOGY

293 Edel'man, N.M. 1952.
Effect of feeding conditions on the physiological state of the gypsy moth and the winter moth. Doklady Akademii nauk SSSR. 84(4):849-852.
-- Feeding on different species, with the same amount of leaf consumption, was found to cause physiological dissimilarities in gypsy moth larvae. When larvae were feeding on leaves of oak, birch or bird-cherry, those feeding on oak had the best physiological parameters. Metabolism also changes in the course of larval development when insects feed on one species. Total nitrogen content in the organisms of gypsy moth larvae is much higher in the early instars than in the later ones. By contrast, fat content increases. Change of food also produces a considerable effect on insects.
ECentral; DEVELOPMENT, FEEDING, HOST PLANTS, NUTRITION, PHYSIOLOGY

294 Edel'man, N.M. 1954.
Behavior of gypsy moth larvae in mixed stands in the Kurbin region of Azerbaijan SSR. In: Trudy Vsesoyuznogo NII zashchity rasteniy. Leningrad: 91-98.
-- The level of gypsy moth infestation of different plant species in mixed stands was studied with regard to adult behavior in the oviposition period, conditions favorable for transportation of first instars by the wind, and migratory abilities of late instars. It is the author's opinion that behavior of adults and larvae is related to feeding conditions of insects in mixed stands. Under these conditions, the favored food plants of the gypsy moth are oak, hornbeam, apple, and hawthorn. In addition, larvae can feed on maple, beech, hazel, alycha, and aspen. A series of experiments was conducted to find out what food plants the gypsy moth prefers. The experiments showed that the favored food species of the gypsy moth is oak. In later instars, larvae become more polytrophic. By that time, leaf quality of oak has deteriorated, leaves grow tough and lose water, causing changes in physiological condition of larvae. In general, transfer of gypsy moth larvae from favorable to unfavorable food results in a worsening of the insect's the physiological condition and a decrease in fecundity. On the basis of these factors, the author suggests creating mixed forest stands containing species not favored as food by gypsy moth larvae.
MAsia; FOLIAGE QUALITY, HOST PLANTS, SILVICULTURAL TREATMENTS

295 Edel'man, N.M. 1954.
Effect of feeding regime on metabolism in the gypsy moth and the winter moth. In: Trudy Vsesoyuznogo NII zashchity rasteniy. Leningrad: 75-90.
-- The author studied the effect of gypsy moth feeding on species often found in shelter belts (oak, linden, apple) on insect metabolism, as well as the effect of food change on physiological parameters. Larval weight, respiration intensity, respiration rate, content of lipids, and total nitrogen were determined. Different physiological processes occurring in the insect organism are strongly interrelated. For instance, more rapid growth of gypsy moth larvae is always accompanied by more intensive oxygen uptake. This is the case whether larvae feed on one species or on many. There is a correlation between relatively small weight increment of larvae and high mortality. Size of late instars and pupal size determine imago fecundity. A correlation also was observed between respiration rate, fat content, and larval survival. An increase in number is achieved by feeding on species such as oak and apple, which provide the gypsy moth with sufficient protein nutrition. However, the introduction of linden and birch into stands will limit fecundity since these species do not afford accumulation of sufficient nitrogen content.
ECentral; BEHAVIOR, FEEDING, HOST PLANTS, PHYSIOLOGY

296 Edel'man, N.M. 1954.
Fauna of folivorous and trunk pests and changes in its composition and abundance in shelter belts of the Kamennaya Steppe over a 20 year period. In: Trudy Vsesoyuznogo NII zashchity rasteniy. Leningrad: 143-164.
-- Species composition of pests in shelter belts of Kamennaya Steppe (Voronezh Province) is diverse, including more than 120 insect species. In the 1950s, the most widespread species were the green oak leaf roller and the gypsy moth. In general, pest complexes changed with the age of the shelter belts. Weather conditions are extremely important for numerical fluctuations of insects. Gypsy moth development was 58 to 60 days long in favorable years and 68 to 70 days long in unfavorable years. In both different geographical zones and in one geographical zone, the number of molts is not stable, varying depending on weather conditions and food quality. Males can have 5 or 6 instars, females 5 to 7 instars. Weather conditions affect the insects both directly and indirectly, through plants, by changing food biochemical composition. Treatment of egg masses with petroleum and insecticide treatments reduces the number of insects in the current season but contributes to sanitation of the population. There is always the danger of a rapid increase in pest number if these measures are stopped, as is demonstrated by the situation with the gypsy moth and the green oak leaf roller. Decrease in the gypsy moth population was achieved by making shelter belts more

dense and by creating a thick undergrowth.
ECentral; CONTROL, DEVELOPMENT, EGG MASSES, FOLIAGE QUALITY, SILVICULTURAL TREATMENTS, WEATHER

297 Edel'man, N.M. 1957.
Use of gypsy moth food specialization to justify control measures. Zoologicheskiy zhurnal. 36(3):408-420.
-- Feeding preferences of the gypsy moth can be used to prevent pest outbreaks by creating stands that limit populations of this species. It is suggested that species not favored as food by the gypsy moth should be introduced into linden and pea shrub stands.
MAsia; HOST PLANTS, SILVICULTURAL TREATMENTS

298 Edel'man, N.M. 1963.
Age-dependent changes in the physiological state of some dendrophilous insect larvae relative to feeding conditions. Entomologicheskoye obozrenie. 42(1):11-21.
-- Experiments were conducted with *Tortrix viridana, Operopthera brumata, Lymantria dispar, Malacosoma neustria, Diptera alpium, Leucoma salicis,* and *Croesus septentrionalis.* The first four species hatch in the spring, take a long time to develop, and adapt to changes in food biochemical composition. The fifth species is a summer species, and the sixth species feeds primarily on root growth. Larvae of these two species require stable chemical composition of food for normal development. The last species is bivoltine, and adapts to changes in food quality in different generations. Changes in insect physiological condition and adaptability level at the larval stage are the result of the influence of growth factors and insect development, and of environmental impact. Phytophages with a long developmental period adapt to changes in feeding conditions occurring in an orderly sequence, while insects with a short developmental period adapt to strictly specified food with a more stable biochemical composition.
MAsia; DEVELOPMENT, FOLIAGE QUALITY, NUTRITION,

299 Effendi, R.Ye., Abdullaev, S.Y. 1982.
Gypsy moth outbreaks in the South Zakavkazye. Zashchita rasteniy. (1):47.
-- It is the opinion of the authors that the boundary of gypsy moth area goes across the southern Zakavkazye, and is assumed to be the factor causing outbreak periodicity in the Zakavkazye. Outbreaks were recorded in 1970 to 1971 (Yalamin forest) and in 1974 to 1977 (Giran forest) in the Lenkoran Region. In 1971 up to 400 egg masses were found on some trees, and the average number of eggs per mass was 300 to 400. The authors regarded these egg masses as inferior when compared to generally recognized pest fecundity (800 to 1200 eggs). Major food plants in the region are chestnut oak, beech, cork oak, pecan, three-thorned acacia, and silk tree. Nettle tree was attacked in the period of outbreak. In the forests at the foothills of the Bigger and Smaller Caucasus, population increase was insignificant.
Caucasus; DISTRIBUTION, FECUNDITY, HOST PLANTS

300 Epova, V.I., Pleshanov, A.S. 1988.
Areas damaged by gypsy moth in Siberia and the Far East. In: Neparnyy shelkopryad: itogi i perspektivy issledovaniy. Institut lesa i drevesiny SO AN SSSR, Krasnoyarsk: 30-31.
-- The gypsy moth is a thermophilous species, therefore, it is found along the southern borders of Siberia and the Far East. In this territory, phyllophage gradations occur in strictly specified regions and are different in character which is determined both by genetically fixed geographical forms of the species (Siberian, East European), and by specific features of habitats. The Siberian form is characterized by adult migrations as well as by migrations of first instars. This behavior makes foci highly mobile at the peak outbreak phase, allowing the pest to avoid the effect of regulating factors and lowering the probability of multiple defoliations of the same stands. Adults of the east Asian form are not so vagile, foci are more stable and, at the sparse population phase, entomophage activity increases. Having significant differences in terms of ecology, both geographical forms still have equal response to the effect of modifying factors of population dynamics. When the weather gets colder the insects start searching for drier habitats. The most important parasites of the east Asian form are *Phobocampe unicincta* Grav., *A. melanoscelus* Panz., and *Blepharipa schineri* Meisn. These parasitize about 80% of the insects in the foci. The most effective species is *Blepharipa schineri* Meisn., which can parasitize about 50% of the pupae. It is concluded that gypsy moth ecological peculiarities should be taken into account in estimating activity of this pest and in conducting forest insect pest monitoring.
ESiberia, Far East; GEOGRAPHIC VARIATION, PARASITES, POPULATION DYNAMICS

301 Eversmann, E. 1837.
Short notes on the behavior of several Russian butterflies (in German). [Kurze Notizen uber einige Schmeterlinge Russlands als Betrege zu Treitschkes supplementen zu Betrachten.] Byulleten' Moskovskogo obshchestva ispytatelei prirody. (1):5-35.
-- The gypsy moth is listed among lepidopterous insects of Kazan Province (Gorky Province) and Orenburg Province. It is widespread in oak and birch forests, causing from severe to total defoliation.
ECentral; PEST LIST

302 Eversmann, E. 1841.
Observations on several butterflies (in German). [Beobachtungen uber einige Schmetterlinge.] Byulleten' Moskovskogo obshchestva ispytatelei prirody. (1):3-14.
-- The paper discusses larvae of nocturnal moths. In 1828, gypsy moth larvae were found in great numbers in Orenburg and Saratov (Volgograd) Provinces. In 1829, a nun moth outbreak was recorded in those parts.
ECentral; LARVAE, OUTBREAKS

303 Farinets, S.I. 1978.
Tachinids - parasites of the gipsy moth. Zashchita rasteniy. 5:32.
EWest; PARASITES

304 Fedorov, S.M. 1930.
Pest insects in forests of the Crimea. Russkoe

entomologicheskoe obozreniye. 24(3-4):225-229.
-- The gypsy moth is mentioned as one of the most important forest pests of the Crimea. Pest outbreaks were recorded in 1898 near Feodosia (data from Mokrzhetskiy), and in 1912 near Sudak within an area of 5,400 acres. By 1913, the outbreak collapsed as a result of entomophage and disease activity. *Apanteles fulvipes* and *A. solitarius* are mentioned as important entomophages. In 1930, a population increase was recorded in the Sevastopol and Baidar forest areas.
EWest; OUTBREAKS, PARASITES

305 Fedoryak, B.Ye. 1982.
Gypsy moth and its control in the forests of the Kustanay region. In: Zhivotnyy mir Kazakhstana i problemy ego okhrany. Alma-Ata: 184-186.
-- General data are given on gypsy moth biology and ecology in local populations. The results of aerial chemical treatments of forests with chlorophos and bacterial preparations in 1977-1978 are discussed.
MAsia; AERIAL SPRAYING, CHEMICAL INSECTICIDES

306 Filip'yev, I.N. 1929.
The gypsy moth. In: Nekotoryye zakonomernosti rasprostraneniya i razmnozheniya massovykh vrediteley. Gosudarstvennyi institut opytnoi agronomii, Leningrad: 9-10.
-- The gypsy moth is regarded as a serious orchard pest in the southern part of the country. During outbreaks, it can defoliate forest and fruit trees. Outbreaks are recorded only in southern and central regions; north of Smolensk and Tver, pest outbreaks have not been recorded. Entomophages play an important part in suppressing gypsy moth outbreaks. The author considers the issue of pest distribution in the United States and the attempt to introduce some European entomophages into the U.S. for suppression of pest populations.
EWest; GENERAL BIOLOGY

307 Fomina, V.I. 1973.
Results of terrestrial treatment of forest shelter belts with bacterial preparations. In: Lesokhozyaystvennaya nauka i praktika. Moskva: 221-222.
-- Four bacterial preparations were applied in high density gypsy moth foci in Chernigov Province in 1971. Dendrobacillin and gomelin proved to be the most effective preparations.
EWest; BACTERIA, MICROBIAL PESTICIDES

308 Galanova, T.F. 1980.
Biochemical aspects of intrapopulation variability in the gypsy moth. In: Rol' dendrophil'nykh nasekomykh v tayezhnykh ekosistemakh. Tezisy dokladov Vsesoyuznoy konferentsii, Divnogorsk, 1980. Institut lesa i drvesiny SO AN SSSR, Krasnoyarsk: 27-28.
-- Hydrolase enzymes from the middle intestine of late-instar gypsy moth larvae obtained from foci of different densities (population increase, outbreak) were studied using electrophoresis. During outbreak, the number of phosphatase forms was reduced, while the number of esterase and acid phosphatase forms was higher in outbreak populations. This means that the larvae respond to the change in food quality, i.e., refoliation of oak after severe defoliation and a difference in physiological processes at gradation phases.
EWest; BIOCHEMISTRY, ISOENZYMES, FOLIAGE QUALITY

309 Galanova, T.F., Derevyanko, N.M., Shvedova, R.I. 1981.
The study of some hydrolases in gypsy moth eggs. In: Sbornik nauchnykh trudov Moskovskogo pedinstituta im. V.I.Lenina. MGPI, Moskva: 104-113.
-- By electrophoresis in polyacrylamide gel of insects different in larval coloration, activity and dynamics to distinguish among the forms of acid and alkaline phosphatases, esterase and amylase were studied in prediapausing gypsy moth eggs. Activity of esterase and amylase in the eggs of grey phenotype females is much higher than that in the eggs of black phenotype females. However, in the latter, alkaline phosphatase activity is higher; the acid phosphatase activity is same. This could provide evidence for genetic differences among gypsy moth specimens.
EWest; COLOR POLYMORPHISM, EGGS, ISOENZYMES, GENETICS

310 Galanova, T.F., Derevyanko, N.M., Shvedova, R.I. 1981.
The study of hydrolases during gypsy moth metamorphosis. (Izucheniye gidrolaz v protsesse metamorfosa neparnogo shelkopryada.) Institute of Zoology Academy of Sciences of UkSSR, Moscow. 18 p. (Deposited document. VINITI 4001-81)
-- Acid and alkaline phosphatases, esterase, and amylase was studied in gypsy moth eggs when diapause was being established and when embryogeny was completed. The populations examined had larvae that varied phenotypically in color. Changes in hydrolase activity and numerous enzyme forms distinguished by electophoresis in polyacrylamide gel prove that the gypsy moth, in the egg stage, is not structurally uniform.
EWest; COLOR POLYMORPHISM, EGGS, ENZYMES, GENETICS

311 Galanova, T.F., Derevyanko, N.M., Shvedova, R.I. 1982.
The study of hydrolases by the gypsy moth metamorphosis. Vestnik zoologii. (6):80-83.
-- Daily activity and dynamics of hydrolytic enzymes of first and fifth instars feeding on oak leaves were studied. Fifth instars also were subdivided by grey and black phenotypes. First instars showed maximum activity of esterase and amylase on the second day of development and maximum activity of acid and alkaline phosphatases on the third day. For fifth instars activity of these hydrolases was the highest on the second day after molt and then became lower until the next molt. Values of hydrolase activity for grey and black larvae are the same. The only difference is in the number of enzyme forms, which points to non-uniformity in the population.
EWest; COLOR POLYMORPHISM, ENZYMES, GENETICS

312 Galanova, T.F., Kolybin, V.A. 1984.
Study of ferments in gypsy moth from different

geographic zones of the USSR. In: Tezisy dokladov IX s"yezda Vsesoyuznogo entomologicheskogo obshchestva. Naukova Dumka, Kiev: 100.
-- Enzyme polymorphism was found in gypsy moth populations in the territory close to the Carpathian Mountains, the central part of the USSR, Krasnoyarsk Krai, and the Lower Dnieper Region. Variation of activity and mobility of acid and alkaline phosphatase forms was established. Differences were found not only in the isoenzyme structure of gypsy moth geographical populations but also in the value of activity of some enzyme forms.
EWest, ECentral, WSiberia; GEOGRAPHIC VARIATION, ENZYMES, GENETICS

313 Galanova, T.F., Kolybin, V.A. 1985.
Estimation of adaptive changes in gypsy moth population on the basis of biochemical polymorphism analysis. In: Sistema monitoringa v zashchite lesa. Tezisy dokladov Vsesoyuznogo soveshchaniya. Institut lesa i drevesiny SO AS SSSR, Krasnoyarsk: 168-170.
-- Amylase, acid, and alkaline phosphatases of gypsy moth larvae from the territory near the Carpathian Mountains south of the Ukraine, and the central part of Russia south of Siberia are regarded as indicators of the level of insect adaptation to environmental conditions.
EWest, ECentral, WSiberia; ENZYMES, GEOGRAPHIC VARIATION

314 Galanova, T.F., Surgova, T.M., Derevyanko, N.M. 1982.
Study of cellulosis in gypsy moth (*Lymantria dispar* L.) eggs. Vestnik zoologii. (1):79-80.
-- Dynamics of Cx-exogluconase during embryogeny activity was studied. Cx-exogluconase is produced when the chitinous eggshell is broken. No Cl cellulase was found in the eggs.
EWest; EGGS, ENZYMES

315 Galasiyeva, T.V., Lebedeva, G.S. 1982.
Patterns of gypsy moth foci in hardwood stands at the Pribelsk department of the Bashkirian Preserve. In: Ekologiya i zashchita lesa. Leningradskaya lesotekhnicheskaya akademiya, Leningrad: 70-74.
-- In stands of the Pribelsk Branch of the Bashkirian Preserve, gypsy moth foci occupied a territory of about 100 ha. The average defoliation rate was about 5% and, in open stands, it ranged from 10% to 30%. By color aberrations, there were 42% typically grey larvae and 34% dark ones. On average, entomophages attacked 5% of the larvae and 8.2% of the pupae. *Pimpla instigator*, and *Lymantrichneumon disparis*, a new species for the gypsy moth in Bashkiria, prevailed. Pathogen infection of larvae was 88%, and 22.9% for pupae. Data on phenology of the species, deposition of eggs, and fecundity are given. There were 7 other species of Lepidoptera besides the gypsy moth in the complex of phyllophages.
EEast; COLOR POLYMORPHISM, NUMERICAL DATA, PARASITES, PATHOGENS

316 Ganiev, M.G. 1986.
Residual amounts of Dimilin in plants and soil of pistachio woodlands southeast of Kirgizia. Lesnoye khozyaystvo. (10):63.
-- Dimilin is a hormonal insecticide that disrupts formation of insect cuticle and is highly specific against phyllophagous pests. At a rate of 0.01 to 0.02 kg of active substance per ha, its efficiency against gypsy moth larvae was 95%. Ten days later, the content of Dimilin in plants and grass was negligible.
MAsia; GROWTH REGULATORS, SOIL

317 Gensitsky, I.P. 1980.
Peculiarities in protein exchange of gypsy moth larvae at different population density levels. In: Issledovaniya po entomologii i akarologii na Ukraine. Tezisy dokladov 2-go s"yezda Ukrainskogo entomologicheskogo obshchestva, Uzhgorod, 1980. Kiev: 226-227.
-- The relationship between protein metabolism of gypsy moth larvae and adult fecundity is found. The minimum content of protein in larval hemolymph that is necessary for the larva to pupate and for the adult to be fecund is 2%. In this case, the adult lays not more than 35 to 50 eggs. During a depression phase, larvae with a low protein content in the hemolymph prevail in the population. When a population increases, the percentage of specimens with high protein content is higher. At the maximum protein level (15%), imago fecundity is 700-800 eggs.
EEast; BIOCHEMISTRY, FECUNDITY

318 Gensitsky, I.P. 1980.
Predicting gypsy moth fecundity by testing protein exchange in the larvae. In: Rol' dendrophil'nykh nasekomykh v tayezhnykh ekosistemakh. Tezisy dokladov Vsesoyuznoy konferentsii, Divnogorsk, 1980. Institut lesa i drvesiny SO AN SSSR, Krasnoyarsk: 29-30.
-- A reliable correlation between gypsy moth fecundity and the level of protein metabolism (the rate of protein synthesis and its accumulation in hemolymph) in larvae ready for pupation is established. A testing procedure is suggested.
EWest; FECUNDITY, PHYSIOLOGY

319 Gershun, M.S. 1951.
The Liparidae family. The gypsy moth, *Porthetria dispar* L. In: Lesnyye vrediteli Uzbekistana. Tashkent: 3-46.
-- A description of all life stages of the pest is given. In Uzbekistan, hatching occurs in April and pupation in May. Pupal locations are on branches and trunks. Oviposition occurs in June and adults fly in June and July. Gypsy moth foci are found mainly in forest stands and orchards and nearby mountainous regions. The gypsy moth attacks different species of poplar, bastard acacia, oak, ash-leaved maple, linden, and birch. During an outbreak, larvae attack field crops nearest to them. The following control measures are recommended: collection of egg masses and treatment with petroleum, and dusting or spraying of trees with arsenic preparations during the larval development period.
MAsia; CONTROL, GENERAL BIOLOGY, HOST PLANTS

320 Geshkova, A. 1977.
Some results of the application of *Bacillus*

***thuringiensis* Ben. to control the gypsy moth, *Lymantria dispar* L., in Slovakia.** In: Problemy biologicheskoy bor'by s vreditelyami lesa. Zvolen: 65-68.
-- Laboratory experiments showed applications of *B. thuringiensis* against the gypsy moth to be effective and to cause 79-100 % mortality in younger larvae when an aqueous suspension was applied at doses of 0.1-5 kg/ha. Field tests confirmed the results of laboratory experiments; there was a drastic reduction of pest numbers in experimental plots. At the time of complete development, there were only few specimens remaining in the foci. In untreated plots, the level of the pest population was high and trees were completely defoliated. While bacterial treatments are 2-3 times more costly than chemical ones, they are very effective.
EWest; BACTERIA, MICROBIAL PESTICIDES

321 Getsova, A.B. 1958.
Food choice by insect larvae in connection with inherent and acquired responses to food. Izvestiya Akademii pedagogicheskikh nauk SSSR. 85:189-195.
-- Food selection by gypsy moth and processionary moth larvae was studied. Gypsy moth larvae were reared on willow and ash. In the middle of each instar they were offered a choice of oak, bird-cherry, birch, willow or ash. The most favored food plant was usually the one on which larvae had been reared. Food selection by larvae is determined mainly by chemoreception.
ECentral; BEHAVIOR, FEEDING

322 Getsova, A.B., Lozina-Lozinskiy L.K. 1955.
The role of behavior in the adaptation of insects to a herbivorous diet. Zoologicheskiy zhurnal. 34:1066-1070.
-- The part played by sense organs of larvae of gypsy moth (a polyphage) and processionary moth (an oligophage) in food selection was studied. Rearing conditions of the present and previous generations and changes in the food plant chemistry were taken into account in the experiments. Differences in food chemistry affect metabolism and are reflected in the behavior and further development of the insect.
ECentral; BEHAVIOR, FEEDING, FOLIAGE CHEMISTRY, REARING

323 Giglavy, A.V. 1989.
Application of virin-ENSh against gypsy moth. In: Lisove gospodarstvo, lisova, paperova i derevoobrobna promislovist'. Kiev: 9-10.
-- Since 1986, virin-ENSh had been applied annually in gypsy moth foci in the forests around Kharkov. The efficacy of the preparation was rather high (71-85 %) and harmless to useful organisms. It is recommended that it be applied in local pest foci.
EWest; MICROBIAL PESTICIDES, VIRUS

324 Gintsenberg, A. 1909.
Gypsy moth control. Plodovodstvo. (1):27-30.
-- The gypsy moth is regarded as one of the most serious forest and garden pests. A large number of pest egg masses is found in gardens of Kursk Province. Eggs are deposited mainly at the trunk base, but eggs also are found at a height of about 15 m. The most effective recommended control method is the treatment of egg masses, before hatch, with kerosene.
ECentral; CONTROL, OVIPOSITION SITE

325 Girfanova, L.N. 1957.
Dipterous entomophages and their significance in reducing gypsy moth density in Bashkiria. Izvestiya vostochnykh filialov Akademii nauk SSSR. (9):102-109.
-- A complex of dipterous parasites of the gypsy moth was studied in the forest cenoses of Bashkiria (1952-1955). Fourteen species of tachinids and sarcophagids were found. The author considers 7 dipteran species to be effective: *Parasarcophaga pseudoscoparia, P. uliginosa, Kramerea schitzei, Pseudosarcophaga affinis, Sturmia scutellata, Phorocera silvestris*, and *Larvaevora larvarum*. The part played by each species in parasitization of gypsy moth in its foci is determined by a number of factors: yearly variation of populations, population change in relation to the host gradation phase, the state of the focal area, etc. The remaining 7 species are secondary parasites that the author does not believe have a significant effect on the numbers of entomophages. It is considered promising to rear predatory sarcophagids and Muscina stabulans in the laboratory and introduce them into pest foci.
EEast; BIOLOGICAL CONTROL, PARASITES, PREDATORS

326 Girfanova, L.N. 1958.
Fauna of parasitic and predatory dipterans in Bashkiria. In: Issledovaniye ochagov vrediteley lesa Bashkirii. Ufa: 52-56.
-- Data on 88 dipteran species parasitizing lepidopterans are presented. Fourteen dipteran species are listed as entomophages of the gypsy moth. These are the sarcophagids, *Thyrsocnema laciniata, Parasarcophaga harpax, P. scoparia, P. pseudoscoparia, P. similis, P. uliginosa, Kramerea schutzei*, and *Pseudosarcophaga affinis*, and the tachinids, *Tachina grossa, Sturmia bella, S. scutellata, Phorocera silvestris, Larvaevora rustica*, and *L. larvarum*. Data on the place and time of collection or rearing of every species are given.
EEast; PARASITES, REARING

327 Girfanova, L.N. 1962.
Morphological patterns of flesh fly larvae (Sarcophagidae) parasitizing gypsy moth pupae. In: Issledovaniya ochagov vrediteley lesa v Bashkirii. Ufa: 117-122.
-- In Bashkiria, from 1953 to 1960, 9 sarcophagid species were reared from gypsy moth pupae: *Parasarcophaga albiceps, P. tuberosa, P. portschinskyi, P. harpax, P. scoparia, P. pseudoscoparia, P. uliginosa, Kramerea schutzei*, and *Pseudosarcophaga affinis* parasitize healthy pupae whereas: *P. albiceps, P. tuberosa*, and *P. scoparia* are necrophages. Morphology of late instar sarcophagids also is discussed.
EEast; PARASITES

328 Glazenap, S.P. 1920.
Control of garden pests hibernating as eggs. In: Byulleten' 2-go Vserossiyskogo entomo-

fitopatologicheskogo s"yezda v Peterburge 25-30 oktyabrya 1920. Peterburg: 28.
-- Collection of egg masses and treatment with petroleum are suggested as gypsy moth control measures.
CONTROL, EGG MASSES

329 Gninenko, Yu.I. 1981.
Ways of updating inspection of forest pests in Kazakhstan. In: Nadzor za vreditelyami i boleznyami lesa i sovershenstvovaniye mer bor'by s nimi. Tezisy dokladov. VNIILM, Moscow: 37-38.
-- In some parts of the republic of Kazakhstan (island pine forests in the north and mountain hardwood and coniferous forests of Altai), gypsy moth outbreaks occur regularly. However, conventional forest pathology monitoring of gypsy moth foci is often impossible because egg masses are deposited on bare rocks outside the forest.
MAsia, WSiberia; MONITORING, OVIPOSITION SITE

330 Gninenko, Yu.I. 1983.
Effect of the virus preparation virin-ENSh on gypsy moth population dynamics. Vestnik sel'skokhozyaystvennoy nauki (Kazakhstana). (7):86-88.
MAsia; MICROBIAL PESTICIDES, VIRUS

331 Gninenko, Yu.I. 1986.
Elements of monitoring gypsy moth population in Kazakhstan. Lesovedenie. (4):45-49.
-- Peculiarities of biology and ecology of four gypsy moth geographical forms distinguished by the author in Kazakhstan are discussed. A retrospective analysis of the population dynamics of this species is made. For monitoring of gypsy moth populations, it is suggested that the population be divided into four zones with an independent network of control stations established in each zone.
MAsia; GEOGRAPHIC VARIATION

332 Gninenko, Yu.I., Kovalevskaya, N.I. 1988.
Study of the esterase enzyme complex in gypsy moth populations. In: Nepamyy shelkopryad: itogi i perspektivy issledovaniy. Institut lesa i drevesiny SO AN SSSR, Krasnoyarsk: 9-10.
-- The esterase enzyme complex of eggs from different Kazakhstan populations has been analyzed. Four to 8 protein zones with esterase activity were found, and three major activity zones were distinguished. All three zones are polymorphic, i.e. they are represented by forms of different electrophoretic mobility, which allows types of activity zone distribution to be distinguished by inhibitory analysis. In three parts of northern Kazakhstan, specimens with the esterase activity type characteristic of heterozygous organisms tend to accumulate in populations with high density levels. The data obtained suggest a selective nature of polymorphism of esterase activity zones. It is assumed that unfavorable conditions for the population are being made in favor of heterozygotes.
MAsia; EGGS, ENZYMES, GENETICS

333 Golosova, M.A. 1988.
Gypsy moth diseases and prospects for their use in forest protection. In: Nepamyy shelkopryad: itogi i perspektivy issledovaniy. Institut lesa i drevesiny SO AN SSSR, Krasnoyarsk: 35-36.
-- The baculovirus, Reprimeus, is the most promising pathogen causing a lethal disease in larvae. A latent pathogen is widespread in gypsy moth populations and it can be activated if external and internal factors combine to create favorable conditions for a nuclear polyhedrosis epizootic. In some host populations, a native virus of cytoplasmic polyhedrosis, *Reovirus disparis*, is extracted, and the virus, *R. pini* (strain MLTI), is adapted to the gypsy moth in the laboratory. This group of viruses causes intestinal polyhedrosis and has a marked protective effect. In the specimens that survived, the virus caused teratogenesis and a decrease in fecundity. It also can activate latent polyhedrosis infection. Therefore, the pathogens can be regarded as promising biocontrol agents. Bacterial flora of the gypsy moth are numerous. Pathological material of larvae and pupae contained toxic bacteria of the group *Bacillus thuringiensis* and some saprophytic bacteria of the genera *Pseudomonus, Serratia, Streptococcus*, and *Bacillus cereus*. There also were some species of microsporidia in the pathological material taken from gypsy moth foci and, in the laboratory, larvae appeared susceptible to some microsporidia extracted from the browntail moth. Two species, *Nosema lymantria* and *Plistophora schubergi*, occurred most frequently in natural foci. *N. muscularia* is a common microsporidium of the browntail moth, which readily infects gypsy moth larvae. All three species often provoke nuclear polyhedrosis and can be considered promising agents for creating complex biological preparations causing mixed infection by synergistic action.
ECentral; BACTERIA, MICROBIAL PESTICIDES, MICROSPORIDIA, VIRUS

334 Golubev, A.V., Semevskiy, F.I. 1969.
Distribution of gypsy moth populations during the depression phase. Zoologicheskiy zhurnal. 48(6):850-859.
-- The regularity of distribution of gypsy moth egg masses was studied during the depression phase of the population cycle. Infestation of forest plots follows the log normal law of probability distribution. Forest quality has only a slight effect on the population density. Age, closing of leaf canopy, and complexity of composition accounted for as little as 14% of the variation in population density. In plots of disturbed forest environments, forest edges, grazings, parks, and shelter belts, population density was 44 times higher than in the forest interior. Distribution of the population at the depression phase is exceptionally stable. From year to year, egg masses can be found in the same plots, in the same forests. The extent to which the forest environment is disturbed and the availability of egg masses should be the basis for population density counts during a depression phase.
ECentral; EGG MASSES, SAMPLING, STAND COMPOSITION

335 Golubeva, T.V., Orekhov, D.A. 1990.
Survival determination of gypsy moth larvae with the help of hemolymph coloration. In: Uspekhi entomologii v