Insect Rearing Group

FRASS NEWSLETTER

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FRASS EDITOR

Ronald E. Wheeler
Chevron Chemical Company
P.O. Box 4010
Richmond, California 94804 USA
Telephone (415)231-6344

This issue of FRASS is brought to you by the Chevron Chemical Company, Agricultural Chemical Division, ORTHO RESEARCH CENTER, Richmond, California.

WHAT IS THE FRASS NEWSLETTER?

The FRASS NEWLETTER is a cooperative effort among the INSECT REARING GROUP, designed to provide a vehicle for communication among scientists involved in all aspects of insect rearing. FRASS is pulblished bi-annually by the INSECT REARING GROUP, who consist of the 300+ FRASS subscribers from 28 countries. This is your newsletter and its effectiveness as a communiction tool depends on the continuous input of information from you. Your input is very important and needed to keep the INSECT REARING GROUP informed on the current state of the art and to promote its advancement.

TO GET FRASS OUT, WE NEED INPUT

Please give your support by sending to the FRASS Editor: Editorial comments, short papers on new rearing techniques, information requests, requests for starter colonies, your source lists for supplies, items for sale or trade, new publication citations or abstracts, announcements, approprie meeting dates, and other related news items.

FRASS EDITORS

1975 N.C. Leppla, USDA-ARS
1976 W.A. Dickerson, USDA-ARS
1977 T.M. Odell, USDA forest service
1978 E.G. King, USDA-ARS
1979 J.D. Hoffman, USDA-ARS
1980 R.E. Wheeler, Chevron Chemical*
1981 G. Rymeus, Zoecon Industries
1982-84 No issues, concentrated on other activities.
1985 D.R. Edwards, FMC
1986 S. Burkhart, FMC
1987 R.E. Wheeler, Chevron Chemical
* Maintains mailing list.

NEWS FROM THE 1986 ANNUAL ESA MEETING, RENO, NEVADA

Many thanks to Norm Leppla, Pat Greany, and Tom Odell for organizing a highly successful 1986 FORMAL CONFERENCE: Biotechnology and Insect Rearing: Potential for Insect Control. To the delight of all attenders, the conference meeting room was one of the movie theaters at the MGM Grand Hotel and it was certainly the most comfortable seating and viewing advantage ever encountered at an ESA meeting! For those who were unable to attend the conference, abstracts of the invitational papers are presented below:

1. INTRODUCTION. Norm Leppla, USDA-ARS, P.O. Box 14565, Gainesville, FL 32604. ABSTRACT: Insect rearing is on of the established subject areas of entomology and molecular biology is perhaps its newest thrust. The fields are interdependent, particularly as they pertain to insect pest management. Thus, insects must be carefully reared to support development of new technologies and to engage in large-scale field applications.

   During the past year we have seen a virtual explosion in what is now termed "molecular entomology". Research areas of current interest include so called genetic sexing, induction of pesticide resistance in beneficial insects, genetic markers, hybrid sterility, production of resistant plants, replacement of susceptible vectors, and a variety of other biotechnologies. Advancements in many of these areas will depend on the availability of colonized insects, so it behooves insect rearing specialists to be at least minimally familiar with the terminology and concepts of biotechnology.

   Molecular entomology has stimulated increased communication and involvement with the insect rearing community. Biotechnology firms from Boston to San Diego have contacted us for insects and insect cell lines. The American Registry of Professional Entomologist is conducting "Introduction to Molecular Entomology" courses. The UCLA Symposium on Molecular and Cell Biology had a session on the "Molecular Biology of Invertebrate Development", from which I Quote: "Invertebrates continue to offer excellent experimental systems to study the molecular mechanisms involved in the regulation of development, due in no small measure to the facility with which they can be cultured, their relatively small genome and the number and array of the critical signals (e.g. hormones, pheromones, neuropeptides)"

2. STAIN DEVELOPMENT IN INSECT MASS PRODUCTION PROGRAMS. David B. Taylor, USDA-ARS, Screwworm Research Lab., Apartado Postal #544, Tuxtla Gutierre, Mexico. ABSTRACT: The history and future of strain development for insect mass production programs can be divided into 3 era. The techniques used during each era are guided by ; the prevailing ideas of population biology and genetics of the time. The era of "Little concern' was characterized by the typological species concept. If all members of a species were thought to be the same, there was little reason to concern oneself with the genetic makeup or compatibility of a mass production strain. The second, and current era of strain development, is that of "Luck be with us". The guide to this era has been the tremendous advances in population biology and genetics. These advances have revealed the true degree of genetic variation within species, population substructuring, and potential for genetic adaptation of populations, natural or mass produced. Unfortunately, our knowledge of genetics and ability to manipulate insect strains is insufficient to directly address the

problems of adaptation and compatibility brought forth by this knowledge. Therefore they are addressed on the general terms of high genetic variation and selection against obviously deleterious traits. The final foreseeable era of strain development is that of "Strain engineering". This era will be characterized by genetic engineering, probably at the molecular level. Individual traits will be introduced or excised from candidate mass production strains while leaving the remainder of the genome intact. Though molecular genetics may be the primary tool for the implementation of strain engineering, a large foundation of basic genetic and biological information will be needed to determine which characteristics need modification and what the consequences of such modifications may be.

3. GENETIC CHANGES IN SCREWWORM COLONIZATION: MATE SELECTIVITY AND MATING AGGRESSIVENESS. R. L. Mangan, USDA-ARS, Screwworm Research Lab., Apartada Postal #544, Tuxtula Gutierrez, Mexico. ABSTRACT: Screwworms and numerous other insects, when mass reared under artificial conditions, experience ecological conditions drastically different than those normally encountered by sylvatic populations. For the screwworm, dense populations, single opportunities to oviposite, intense intermale competition, and lack of refuge for females after copulation impose selective forces quite different from conditions in the field. In addition, while native screwworms make up much less than 1% of the blowfly community, in colony there is no selective advantage for efficient mate recognition systems. Screwworm strains which have experienced extended time (more than 1 year) in mass rearing colony exhibit several traits which appear to be responses to this selective regime. Increased mating aggressiveness by males has been known since the early 1960's. In the late 1970's asymmetric selective mating patterns were discovered in which wild (newly colonized) males were found to discriminate against females from old strains, but new strain females were attractive to males of both old and newly colonized strains.

A series of crosses and backcrosses were carried out to investigate the generality and the mode of inheritance of both selectivity and aggressiveness. Asymmetric mating patterns were found for all of the last 4 strains used in the eradication program (1978-1984) when tested with new lines from Guatemala. When new line x old line hybrids were tested, selective behavior appeared to; have considerable, but not complete, dominance over non-selective behavior. Hybrids were at least as aggressive as the old line parent, indicating that aggressiveness also has some dominance. A test to select for high aggressiveness and lack of selective mating in one line and for selective behavior and low aggressiveness in a second line resulted in significant divergence in paired lines selected in opposite directions in 4 generations. The heritability and rapid response to selection indicate that potentials for non-selective behavior and aggressiveness are probably present in natural populations. In order to genetically program a new strain the mode of inheritance and map locations of loci affecting these behaviors must be discovered.

4. BIOTECHNOLOGY AND INSECT CONTROL: ROLE OF HOST FACTORS IN in vitro PRODUCTION OF TACHINIDS AND TRICHOGRAMMA. William C. Nettles, Jr., Southern Crops Research Lab. Cotton Insects Research Unit. P.O. Drawer DG, College Station, TX 77841. ABSTRACT: Research on Eucelatoria bryani Sabrosky (Diptera:Tachinidae) and Trichogramma pretiosum Riley (Hymenoptera:Trichogrammatidae) supports my theory that mutations occurring in at least several species of entomophagous parasitoids cause them to be dependent on low molecular weight chemicals from host insects. The in vitro rearing of many species of pest insects of great economic importance may be dependent on the identification of essential factors from host insects and inclusion of these factors in artificial diets. Biotechnology could provide another solution to this problem; restoration of "lost" genes to parasitoids would allow these beneficial insects to be reared on less expensive artificial diets.

5. ASSIMILATION, TRANSPORT, AND DISTRIBUTION IN INSECTS OF MOLECULES FROM NATURAL AND ARTIFICIAL DIETS. J.P. Shapiro and W.J. Schroeder, USDA-ARS, 2120 Camden Rd, Orlando, FL 32803. ABSTRACT: Development of future biotechnological and conventional insecticides was compared, and the importance of oral toxicity and dietary assay to biotechnology noted. Initial feeding studies with coumarins and synthetic analogs followed the absorption of a benzylamino coumarin from a semi-defined diet by the root weevil Diaprepes abbreviatus (a pest of citrus), using spectrofluorometry. We found that the coumarin readily penetrated into hemolymph, where it bound to hemolymph protein.

6. TRANSFER OF USEFUL GENOTYPES FROM LABORATORY TO FIELD POPULATIONS. A.F. Cockburn. USDA-ARS, P.O. Box 14565, Gainesville, FL 32604. ABSTRACT: The only major technical obstacle to the genetic engineering of insects is the development of a way to introduce in vitro modified genes back into insects (the process of transformation). One application will be the introduction of pesticide resistance into beneficial insects. A second use will be the use of transposable elements, or "selfish DNA", to drive genetic control genes into wild pest populations without the need to swamp the population with released insects.

7. POTENTIAL VIRAL GENE VECTORS FOR CONTROLLING INSECT PESTS. E.M. Dougherty. USDA ARS, Beltsville Agricult. Res. Center, Beltsville, MD 20705. ABSTRACT: Several groups of insect viruses have conventionally been viewed as biopesticides capable of controlling insect pests of economic importance. The development of technology capable of manipulation genes has allowed an expanded use of insect viruses. The group A baculoviruses, the nuclear polyhedrosis viruses (NPV) have been genetically engineered to efficiently express foreign genes both in cell culture and in the insect. Genes of importance to the human and animal health care industry have been successfully expressed.

The expression of foreign genes remains a transient phenomena, however, in that the infecting virus kills the host cell. There is a need for stable gene vectors capable of transforming the germ line of an insect species. By inserting the proper gene under conditional control (heat chock promoters, sex specific promoters, vitellogenin gene, etc.) insect populations could theoretically be controlled or sexed or their physiology and biochemistry adjusted to suit societies needs. Insect viruses are one approach for developing vectors capable of carrying such genes and inserting them into the host chromosome. The NPV have been shown to be "sinks" for mobile genetic elements found naturally occurring in insect cell lines. These mobile pieces of DNA are being investigated for potential vector capabilities. Another virus group the Polydnaviridae has recently been shown to integrate in an insect cell genome, the first report ever of viral integration in an insect genome. Finally there remain several virus groups which deserve investigation as possible gene vectors and transforming agents especially the Denoviruses. The cell lines, viruses, molecular procedures and scientific interest are all currently available to investigate the role of insect viruses for creating stable gene vectors. The next decade will determine how much speculation becomes feasibility.

THE 1987 ANNUAL ESA MEETING IN BOSTON

Once more the INSECT REARING GROUP presents a FORMAL CONFERENCE at the Entomological Society Of America National Meeting: November 29-December 3, 1987, Sheraton Boston Hotel, Boston, Massachuetts.

There will be a 4 hour morning session for invitational speakers, and an afternoon session for submitted papers:

FORMAL CONFERENCE: Commercial Insect Rearing:
As a Business, Art, and Science
Moderator: R.E. Wheeler
Chevron Chemical Company
Ortho Research Center
Richmond, CA 94804

TENTATIVE PROGRAM, DEC 2, STARTING AT 8 a.m.:

8:00 Commercial insect rearing. R.E. Wheeler

8:05 Artificial insect diets and diet ingredients. Clark Johnson, BioServ Inc., Frenchtown, NJ 08825.

8:25 Insects supplies for research and teaching. R. Iveson, Wards Natural Science Est., Inc., Rochester, NY 14692.

8:45 Insect rearing and maintenance for insect zoos. S. Love, Smithsonian Institute Insect Zoo, Washington D.C. 20560.

9:00 Entomological equipment and supplies. R.P. Fall, BioQuip, Santa Monica, CA 90406.

9:10 RECESS

9:20 Future aspects in rearing parasitoids. R.K. Morrison, USDA-ARS, College Station, TX 77841.

9:30 Rearing and marketing predators and parasitoids for use in applied biological control, as a commercial enterprise. E.J. Dietrick and A. Sequeira, Rincon Vitova Insectaries Inc., Oak View, CA 93022.

9:50 The nurture of nematodes and the search for immortality. M.J. Friedman, Biosis, Palo Alto, CA 94303.

10:10 Commercial, practical, and political aspects of gypsy moth parasite production and use. M. Ticehurst, National Gypsy Moth Mgt. Group, Inc., Landisburg, PA 17040

10:30 RECESS

10:40 Federal insect shipping permits and requirements. P.L. Lima, USDA-APHIS PPQ, Hyattsville, MD 20782.

11:00 A multi-cell tray system for rearing lepidopterous insects. F.M. Davis, USDA-ARS, Mississippi State, MS 39762.

11:30 Mechanized insect propagation for boll weevil and Heliothis spp.. J. Roberson, USDA-ARS, Mississippi State, MS 39762.

12:00 Insect Rearing Group business meeting.

NOTE: The submitted paper segment of this Insect Rearing Formal Conference will be held this afternoon at 1:30 p.m..

THE 1988 XVIII INTERNATIONAL CONGRESS OF ENTOMOLOGY
Vancouver, British Columbia, July 3 - 9, 1988

For further information on registration and accommodations, contact: Venue West Ltd., #801-750 Jervis St., Vancouver, B.C., Canada V6E 2A9.

INSECT REARING WORKSHOP

Tom Andersbn, of BASF, on behalf of the INSECT REARING GROUP, has organized an insect rearing workshop with the theme of "Quality Control in the Maintenance of Laboratory Colonies". We are looking forward to a very productive workshop with input from an impressive list of Insect rearing authorities throughout the world. Many thanks to Tom for his time and hard work in setting up this workshop!

TENTATIVE WORKSHOP TOPICS

1. Insect rearing management: What is it and why practice it? 2. Laboratory population size necessary for the maintenance of genetic consistency.
3. Genetic changes in laboratory colonies and the maintenance of an appropriate base.
4. "Fitness" of insects released in biological control projects; influence on successful establishment.
5. Laboratory colony monitoring and manipulation to preserve "wild" characteristics, i.e.: Insecticide resistance.
6. Improving the resistance of laboratory reared strains to low temperatures, low humidity, insecticides, and other potential mortality factors.
7. Influence of the host plant or diet on the quality of lab-reared insects, as measured by longevity, fecundity, resistance to insecticides or natural enemies.
8. Manipulation of diapause for stockpiling insects used in biological control programs.
9. Rearing parasitic hymenoptera on artificial diets, an overview.
10. Low maintenance laboratory colonies by long term storage (>1 yr.) of living material.

ANNOUNCEMENTS

1. The publication ARTHROPOD SPECIES IN CULTURE has been revised by D. Edwards, W.A. Dickerson, and N.C. Leppla. It can be purchased for $7.00 from the Entomological Society of America, 4603 Calvert Rd., College Park, MD 20740-3493.

2. Free copies of ADVANCES AND CHALLENGES IN INSECT REARING (1980) edited by E.G. King and N.C. Leppla are available free of charge from Norm Leppla, P.O. Box 14565, Gainesville, FL 32604 (telephone:904-374-5747).

3. Pritam Singh will be a visiting scientist at the USDA, Insects Attractants Labs, Gainesville, Florida, from May to September, 1987. He will be studying quality control in insect rearing.

4. Norm Leppla and other entomologists at the USDA, Insect Attractants Lab, Gainesville, FL., have formed a group under the INTERNATIONAL ORGANIZATION OF BIOLOGICAL CONTROL to provide training in insect rearing quality control. This new program is in addition to ongoing training for insectary managers and Norms' academic program for graduates specializing in insect rearing.

FRASSIFIED ADS

1. WANTED: Utetheisa bella, Stauropus fagi, Cerura vinuia; Orville G. Marti, Jr., USDA-ARS, IBPMRL, P.O. Box 748, Tifton, GA 31793.

2. WANTED: Leucophaea maderae; Sandra Zernos, Dept. of Biol. Sci, Simon Fraser University, Burnaby, B.C. Canada V5A 1S6.

3. FOR SALE: A GLOSSARY OF INSECT REARING TERMS (64 pages, M.D. Ashby and Pritam Singh. $9.95 (US) including postage and handling. The Publications Officer, Science Information Publishing Centre, DSIR, P.O. Box 9741, Wellington, New Zealand.

4. FOR SALE: 1st OFFICIAL FRASS TEE-SHIRT (see below), all sizes at $8.00 or $7.00 for 4 or more. Paul Wales, Royal T Screenprinting, 2555 SW 31st St., Gainesville, FL 32604. (telephone:904-376-7646).

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INSECT REARING MATERIALS AND SUPPLIERS (by Fred Adams, USDA-ARS, Gainesville, Florida). Please send your list to the editor for better regional coverage!

Torula Yeast	Type b	Lake States Div. Rhinelander Paper Co. 515 W. Davenport St. Rhinelander, WI 54501	$ .92/lb
		Bio-Serv Inc. P.O.Box 450 Frenchtown, NJ 08825 412-784-2600	$ 3.10/kg
		McCarthy & Assoc. P.O.Box 752 Port Washington, NY 11050	$ .82/lb
Casein	LT 3A 30-40 mesh	National Casein Co. P.O.Box 226 Riverside, NJ 08077 516-883-1880	$ 1.10/lb
	80-90 mesh	Nutritional Biochemicals P.O.Box 28050a Cleveland, OH 44128 1-800-321-6842	$ 4.31/lb
	Edible	Bio-Serv Inc.	$ 4.48/lb
Gelcarin	NWG GP 812	FMC Corp. 2000 Market St. Philadelphia, PA 19103 -or- Marine Colloids, FMC 367 Civic Dr. Pleasant Hill, CA 94523 415-676-0233	$ 7.78/lb
Ascorbic Acid	U.S.P	Roche Chemical Div. Hoffman LaRoche Inc. P.O.Box 9100 Clifton, NJ 07014 201-235-8080 or 8040	$13.75/lb
		Bio-Serv Inc.	$20.13/kg
Vitomix Mixture	Premix	Roche Chemical Div.	$ 3.92/lb
Wheat Germ	Raw	Earthwonder 1330 E. Battlefield Rd. Spring, MO 65804 417-887-5985	$ .85/lb
		Bio-Serv Inc.	$ .62/lb
		Nutritional Biochemical	$ .48/lb
Methyl Paraben	Methyl- (paracept)	Kalama parahydroxy benzoate U.S.P.	$ 4.70/lb 2900 River Dr. Garfield, NJ 07026 1-800-223-0035
		Bio-Serv Inc.	$13.75/kg
		Lapine Scientific 136 W. Ave. Chicago, IL 60629 312-388-4030	$31.35/lb
Sorbic Acid	Sorbistat K powder	Pfizer Corp. Chem. Dept. 4360 NE Expressway Doraville, GA 30340 404-448-6666	$12.35/kg
Soy Protein	Protein isolate	Nutritional Biochemical	$ 3.00/lb
	0610	Ralston Purina Co. Checker Board Square St. Louis, MO 63188 314-982-2483 or 3224	$ 1.37/lb
Formaldehyde	(polypac)	Fisher Scientific P.O.Box 13430 Orlando, FL 32809 1-800-432-2262	$ 3.34/L
Tetracycline	Capsules 250 mg	Gresham Drugs 3246 SW 35th Blvd. Gainesville, FL 32604 904-372-2556	$19.00/1000
		Goldline 1900 N. Commerical Blvd. Ft. Lauderdale, FL 33309 1-800-345-3111	$16.53/1000
Sodium Thiosulfate	Crystal	Fisher Scientific	$41.17/kg
Parafilm Paper Melimex (I.C.N.)	48 S 8x2000 ft.	Transilwrap $34.28/roll 3616 McCall Place Atlanta, GA 30340 404-458-8121	
Jelly Cells	J-2 Tray	Nu Trend Container P.O.Box 2883 Jacksonville, FL 32236 904-353-5936	$92.00/5000
Clear Cup	# 410 1 oz. Plastic	Fill-Rite 49-55 Liberty St. Newark, NJ 07102 201-476-9088	$80.50/5000
Cup Lids	1 oz. discs 1.476 size	Standard Cap & Seal P.O.Box 1766 Norcross, GA 30091 404-476-9088	$27.30/5000
Cotton Balls	Non-sterile Large	Carolina Absorbent P.O.Box 34276 Charlotte, NC 28234 704-376-0380	$31.16/box

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