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Recent Progress on the Mitchell's Satyr Butterfly and the US-31 Freeway Bypass

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An agreement between Michigan Department of Transportation (MDOT) and The Nature Conservancy (TNC) has been signed recently that allows TNC to carry out land purchases from *voluntary* sellers in areas that contain habitat suitable for the endangered Mitchell's satyr butterfly, *Neonympha mitchellii mitchellii*. TNC is not acting as an agent for MDOT, merely taking on the responsibility that MDOT was faced with pursuant to the 14 April 1994 "Jeopardy Biological Opinion" that was issued by the East Lansing Field Office of the US Fish and Wildlife Service (USFWS) (Hodgkins 1994).

This Biological Opinion was written by the USFWS after a formal section 7 Endangered Species Act consultation that resulted from the proposed US-31 Freeway Bypass that would cross Blue Creek Fen in Berrien County, Michigan (Haack and Walker 1993, Hodgkins 1994). The formal consultation, and resulting Biological Opinion, determined that the project, without modification, would jeopardize the continued existence of the Mitchell's satyr rangewide. The Opinion listed several "reasonable and prudent alternatives" in order to eliminate, to the extent practicable, potential impact to the satyr (Hodgkins 1994). The Biological Opinion allows for the bridge to be built over the fen, with some modifications to minimize negative impacts on the wetland and butterfly habitat. The Biological Opinion also mandated, among other things, the purchase of 1200-1400 acres of fen habitat currently occupied by the satyr for a preserve with perpetual management. This is not mitigation, but a fail-safe in the event that the required bridge modifications would not be sufficient. Land purchase and conservation easements for satyr habitat, under the agreement, will begin immediately.

An additional "reasonable and prudent alternative" mandated in the Biological Opinion was a life history study of the butterfly so that a butterfly conservation plan with a habitat management and monitoring plan would be developed before bridge construction was initiated over Blue Creek. The USFWS is presently negotiating with MDOT to take on those tasks. Ms. Jennifer Szymanski, a onetime USFWS employee at the Bloomington, Indiana Field Office, will conduct these studies during the next four years as part of her graduate program at the University of Minnesota in the Twin Cities of Minneapolis and St. Paul. Jennifer Szymanski will continue to be a part-time USFWS employee while a student, working out of both the Regional Headquarters Office in Minneapolis, Minnesota, and the East Lansing Field Office, Michigan, during the field season.

These developments have truly made this project a "win-win" situation. MDOT gets a much needed freeway bypass in a part of the state that has increasing traffic pressure, and the butterfly gets an entire protected fen with life history research to boot. Without this project, these successes would have been long in coming. And as a bonus, the occupied fen habitat slated for acquisition also contains other State and Federal listed species including butterflies, plants, and reptiles.

Literature Cited

Haack, R.A. & S.H. Walker. 1993. The endangered Mitchell's satyr: biology and controversy. Newsletter of the Michigan Entomological Society 38 (2-3): 2, 6.

Hodgkins, M.E. 1994. Biological Opinion published on the Mitchell's satyr and the US-31 bypass. Newsletter of the Michigan Entomological Society 39 (2-3): 6-7.

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1997 Dues Update

Earlier in 1996 we asked the MES membership to vote on a dues increase for Active Members from $10 per year to $15 per year. This increase was approved by nearly 70% of the members. As the MES Treasurer, it is gratifying to realize that the MES members fully support the Society along with its activities and publications. For your information, the last dues increase occurred 5 years ago. Since that time, expenses related to printing and mailing of the MES journal, newsletter and various notices have risen more than 25%. Costs will undoubtedly continue to increase in the future. As you know, all MES Governing Board members, including the editors of our journal and newsletter, work strictly as volunteers for the Society.

By this time, you will have received your 1997 dues notice. Please pay your dues promptly and let us know of any address changes as soon as you can. There are still 80 members that have not paid their 1996 dues, and some not even their 1995 dues. The total value of these dues in arrears is close to $1000. When dues are paid slowly, I must draw money out early from the Society's bank CDs, and then pay a penalty. **It is the member's responsibility to notify the Society in writing when they cancel their membership**. Said another way, you are responsible for dues in past years until you send a written notice of your resignation. If you have any questions regarding your dues status or MES dues in general, please do not hesitate to contact me by e-mail (nielsen4@pilot.msu.edu) or by phone (517-353-7294). Thank you.

Mogens C. Nielsen, Treasurer

Two New Mitchell's Satyr Sites in Michigan

John Legge
Michigan Natural Features Inventory; Mason Bldg., 5th Floor; P.O. Box 30444; Lansing, MI 48909-7944

Michigan Natural Features Inventory (MNFI) ecologists and zoologists worked together in 1996 to survey for the federally endangered Mitchell's satyr butterfly (*Neonympha mitchellii mitchellii*). Never common, this satyr is now limited to about fifteen populations worldwide.

The Mitchell's satyr is a particularly difficult insect to study, since adults are on the wing for only about two weeks per year, usually in July. To my knowledge, the cryptic, sedge-feeding larvae have never been studied in the wild, and thus little is known of their ecology.

Mitchell's satyr populations occur in prairie fens, a rare natural community in their own right, which are also home to a large number of other imperiled plants and animals. Therefore, MNFI's ecologists decided to identify and survey all remaining prairie fens in 10 southern Michigan counties by interpreting recent aerial photographs and pre-settlement natural community data from the General Land Office surveys of the 1830s. Using various site characteristics that correspond well to satyr populations, they were able to identify the fens most likely to harbor undiscovered satyr populations. The surveys were timed to coincide with the brief satyr flight season, so that the maximum number of locations could by covered. MNFI ecologists Jodi Raab and Will MacKinnon found two spectacular new Mitchell's satyr populations, both with unusually large numbers of the butterflies. MNFI zoologists Daria Hyde and Dave Cuthrell also discovered a significant area of occupied butterfly habitat in a previously unexplored part of a known site.

These discoveries have increased the number of known Mitchell's satyr populations worldwide by at least 15%, a substantial amount by any measure. In addition, zoologist John Legge conducted research on caged females and gathered the first field-based data on the egg-laying and larval feeding preferences of this species. The few previous studies on Mitchell's satyr larvae had been conducted in the laboratory. All in all, it was an excellent year for the satyr surveys. Further surveys for as-yet-undiscovered satyr populations will continue in 1997.

Notices

(Notices will be run for a year or 4 numbers of the Newsletter unless notified to drop them. Members desiring longer runs should notify newsletter editor, Robert Haack, USDA Forest Service, Nisbet Bldg., Rm. 220, 1407 S. Harrison Rd., East Lansing, MI 48823.)

Meeting: The Ohio Odonata Survey is planning for its annual meeting for Saturday, February 22, 1997 at the Museum of Biological Diversity, The Ohio State University in Columbus. Time: 9 am to 4 pm. Contact Bob Glotzhober (rglotzhb@infinet.com) for a map.

New Insect Databases. The Illinois State Museum has added 4 new databases to their web site:

Odonata database: http://www.museum.state.il.us/research/entomology/od_db.html

Non-Illinois odonata collection: http://www.museum.state.il.us/research/entomology/od_outofstate.html

Illinois Dragonfly checklist: http://www.museum.state.il.us/research/entomology/df1list.html

Illinois Damselfly checklist: http://www.museum.state.il.us/research/entomology/df2list.html

Illinois Lepidoptera database, selected families: http://www.museum.state.il.us/research/entomology/leps_db.html

Book Sale. The Insect Study Sourcebook (5th Ed.), by Gary Dunn. This 120-page resource guide, plus 11 pages of new supplemental data is now on sale for US$ 6.00 plus postage (USA: US$ 2.00; Canada/Mexico: US$ 3.00; Other: US$ 6.00). Send checks (in US dollars) payable to: **Young Entomologists' Society;** 1915 Peggy Place; Lansing Michigan 48910-2553 USA.

Free Unit Trays. The Insect Collection of the Center for Arthropod Diversity Study at Michigan State University has thousands of Cornell drawer unit trays available for free distributions. These unit trays are the older type with "hard" bottoms. There is an assortment of sizes of used trays, mostly 16s and 32s (i.e., 16 or 32 trays per Cornell drawer). We also have 6 cartons of new 16s. Each carton contains 425 trays. These new trays could be shipped UPS if you are willing to pay the shipping charges. Contact Fred Stehr at (517) 353 8739, fstehr@msu.edu; or Mo Nielsen at (517) 353 7294, nielsen4@pilot.msu.edu.

Meeting: Michigan Mosquito Control Association Annual Meeting will be held on 13-14 February 1997, at the Grand Traverse Resort, Traverse City, MI. For information, contact: Marry McCarry; Bay County Mosquito Control; 810 Livingston Street; Bay City, MI 48708-6380. Phone: (517)894-4555

New Book: "Insects of the Great Lakes Region" by Gary A. Dunn. Paper edition sells for $16.95 plus $3.50 S&H. (MI residents add 6% sales tax. Make check payable to Young Entomologists' Society, Inc.; 1915 Peggy Place; Lansing, MI 48910-2553. E-mail questions to: YESbugs@aol.com

Website. Midwest Biological Control News on the WWW at: http://www.wisc.edu/entomology/mbcn/mbcn302.html

Dragonfly Society of the Americas. Join the DSA for $15 per year and get the ARGIA newsletter. To enroll, send a check payable to the "Dragonfly Society of the Americas" to: DSA, c/o T. Donnelly, 2091 Partridge Lane, Binghamton, NY 13903.

EntoPrint: Label Making Software. A new product from Entomation to prepare insect labels for the Apple Macintosh. Print thousands of multiple-line labels in minutes. You can serialize your labels and use any font. EntoPrint requires a Macintosh II or better, System 7.0, and a laser printer for best results. Cost $29 plus $2 shipping. Contact: Entomation, 2742 Beacon Hill, Ann Arbor, MI 48104-6502. Phone: 313-971-6033; Email: entomation@aol.com.

Wanted: Michigan Orthoptera Records. Contact: Roger Bland, Department of Biology, Central Michigan University, Mt. Pleasant, MI 48859. Telephone: 517-774-3455; FAX 517-774-3462.

Research Opportunities for qualified investigators at the Huron Mountains in the upper peninsula of Michigan. Submit project proposal and resume (and budget if financial support is requested) by March 1 of each year to: Dr. David Gosling, Director of Research; Huron Mountain Wildlife Foundation; 69063 Wallowa Road; White Pigeon, MI 49099-9745. Phone: 616-651-6417; FAX: 616-651-3679.

Wanted: Data on Michigan butterflies for use in a new publication on the butterflies of Michigan. Doubtful specimens can be forwarded for determination or confirmation. Especially interested in Lycaenidae and Hesperiidae records. Contact M. C. Nielsen, 3415 Overlea Dr., Lansing, MI 48917. Phone: 517-321-2192.

1997 Field Seminars. Several summer field seminars are again available at the Humboldt Field Research Institute, PO Box 9, Steuben, Maine 04680. Aquatic Entomology, August 10-16, by Elizabeth Gibbs & Marcia Siebenmann; Forest Insect Biodiversity, August 10-16, by Richard Dearborn; and Biology of Spiders, August 17-23, by Kefyn Catley. Phone 207-546-2821; Fax 207-546-3042; Email humboldt@nemaine.com; WWW http://maine.maine.edu/~eaglhill

Michigan Flora Part III - Now Available. Ed Voss has just announced that the third and final volume of Michigan Flora, covering families Pyrolaceae through Compositae, is now out. This volume contains 622 pages, 53 full color photographs, 266 line drawings, 771 distribution maps, and keys to all families (with page references to all three volumes). The Flora is now complete! Copies available from: University of Michigan Herbarium, North University Bldg., Ann Arbor, Michigan 48109-1057. The price is $15.00 per copy plus $1.50 per copy for shipping in the US, ($3.50 out of the US). Make checks payable "U. of M. Herbarium."

Odonata of Canada & Alaska - Reprinted. This 3-vol set will soon be reprinted in its original form. Cost will be about $220 Can ($165 US). To gauge interest, please let us know if you may wish to buy a set. Contact: Toronto Entomologists Association, c/o Alan Hanks, 34 Seaton Drive, Aurora, Ontario, Canada L4G 2K1. Phone: 905-727-6993. Email: nmg.vanderpoorten@sympatico.ca

1997 Michigan Entomological Society Annual Meeting

The Forty-Third Annual Meeting of the Michigan Entomological Society will be held on Friday, 23 May 1997, at the Chippewa Nature Center near Midland, Michigan. The Chippewa Nature Center is over 900 acres in size and has over 12 miles of marked hiking trails. Dan Herms will be organizing the meeting. A call for oral papers will be in the next issue of the MES Newsletter. For more information, contact Dan at his new office: Phone - 330-202-3506; FAX - 330-263-3686; Email - herms.2@osu.edu; Address - Dept of Entomology, OSU/OARDC, 1680 Madison Ave., Wooster, OH 44691. For now, Dan is still checking his old MSU Email address (herms@pilot.msu.edu), but you should switch over to the new one at OSU. Please plan to attend the meeting and present a talk!

Pine Shoot Beetle Compliance Program - Taking the Bah-Hum Bug Out of Christmas

Deborah G. McCullough
Department of Entomology, Michigan State University, East Lansing, MI 48824

Introduction

In 1992, a tiny black beetle was discovered feeding inside a shoot of a Scotch pine Christmas tree near Lorain, Ohio. The beetle was sent to an extension specialist, who didn't recognize it. He then sent the beetle on to a scolytid expert who identified the beetle as *Tomicus piniperda* (L.), the pine shoot beetle (PSB). That day marked the beginning of major problems for Christmas tree growers in several North Central and northeastern states.

Michigan Christmas tree producers have been especially hard hit by the discovery of PSB and the resulting quarantine. Michigan is one of the top three Christmas tree-producing states in the country. Roughly 4 to 6 million trees, with an estimated value of nearly 100 million dollars, are harvested in a given year. Although growers cultivate several species, Scotch pine and other pine species continue to account for roughly half of the trees harvested in the state.

Recent research that we have conducted, in collaboration with Cliff Sadof at Purdue University and Robert Haack, USDA Forest Service, has resulted in the development of the PSB Compliance Program. The Compliance Program represents a new approach in the United States to dealing with an exotic pest. A manual that describes the PSB Compliance Program for Christmas Tree Growers can be obtained from the MSU-Extension Bulletin office after January 6, 1997.

Pine Shoot Beetle Life Cycle

Tomicus piniperda is a native of the pine-growing regions of Europe and Asia. Adults overwinter at the base of live pine trees until spring temperatures reach above 50°F for a few days. The beetles leave the base of the tree and fly to recently cut or killed pine trees, logs, stumps or slash - primarily honing in on alpha-pinene and other terpenes emitted by the pine material. The adult beetles bore under the bark and one female mates with one male. The females lay eggs along a gallery that runs parallel with the grain of the wood. Eggs hatch and larvae feed in the inner bark for several weeks, then pupate.

The new generation of adults begins to emerge from the brood material in early June. These new adults fly to live pine trees and begin to tunnel into the center of the shoots. The beetles continue this "maturation feeding" all summer in pine shoots. A single beetle may feed in 2 to 6 shoots during the summer. When hard frosts occur in fall, beetles leave the shoots and move down to the base of the tree to overwinter.

Quarantines and Regulations

When PSB was discovered in Ohio, state and federal regulatory agencies began surveys to delimit the extent of the infestation. Once a beetle or even a tunneled shoot was found, the county was declared infested and the survey crews moved on. As of December 1996, 187 counties in 8 US states were known to be infested with PSB (see map). Michigan leads the nation with 54 infested counties, all in the Lower Peninsula.

A federal quarantine was imposed soon after the original discovery of the beetle in Ohio by APHIS (Animal & Plant Health Inspection Service). The goal of the quarantine was to try to limit the spread of PSB to uninfested areas. States then enacted parallel quarantines. The quarantines regulate the movement of pine logs, nursery trees, and Christmas trees to areas outside of the infested zone.

Under the PSB quarantine, every field of pine Christmas trees that will be shipped out of the quarantined area must be inspected by state or federal regulatory personnel in fall before harvest. If no beetles or evidence of infestation is found during the survey, the trees are certified and can be shipped to the grower's market.

However, if a single beetle or even one tunneled shoot is discovered, the field is restricted. Trees from a restricted field can be sold only within the quarantined area unless they are fumigated with methyl bromide. Fumigation is not a popular option with Christmas tree growers. Methyl bromide is expensive, toxic, sometimes causes needles to fall prematurely or become discolored, and is considered an ozone depleter.

The assumption underlying these practices is that inspectors will nearly always be able to determine if a field is infested with PSB. Thus, a tree from an inspected and certified field presents "zero risk" of introducing PSB to a new area. The assumption of zero risk is probably difficult to achieve, especially when hundreds of thousands of trees must be inspected in a relatively short time period.

Problems with the Current Situation

While most growers have been cooperative with inspectors and regulatory agencies, economically significant damage due to PSB has been rarely observed in managed Christmas tree plantations. Growers question the need for stringent regulations when they see little evidence of PSB populations or PSB-related injury.

Another problem is that in many cases, growers have signed contracts with buyers, shippers, etc., only to learn late in the season that they will be unable to deliver trees. This was exacerbated in some years when counties were not added to the quarantine until late in the summer.

Many growers have reacted to the quarantine regulations by repeatedly spraying trees throughout the summer with broad-spectrum insecticides. These efforts were made to ensure that one damaged shoot wouldn't cause an entire field to be restricted - but are obviously not economically or environmentally desirable.

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PSB Compliance Program

This situation led to the development of the PSB Compliance Program for Christmas Trees, which will go into effect in 1997. Growers can elect to enroll fields that will be harvested in 1997 in the Compliance Program. They must then follow an integrated management program designed to control PSB populations in their fields. If all management practices are followed, deadlines are met, and records of all activities are maintained, that field will be determined to be *in compliance*. Trees grown under compliance can then be shipped out of the quarantined area, without a fall inspection. In other words, if growers follow good management practices, they are rewarded, i.e., they can ship trees without the worry that fields will be restricted just before harvest.

The program was approved by the National Plant Board, APHIS and various other federal and state regulatory agencies in 1996. A master list of enrolled fields in compliance will be maintained on the World Wide Web by state and federal regulatory agencies.

The Compliance Program requires nearly a year-round management effort by growers. The key to limiting PSB populations is to eliminate, as much as possible, the cut pine trees, stumps and other forms of brood material that the beetles need in spring. In Christmas tree production, this means that trees cut within the last 9 months must be burned or chipped by mid-May, before the new generation of beetles can emerge to begin shoot-feeding. Stumps must be cut as low to the ground as possible or treated with an insecticide in spring, to prevent brood development there.

In addition, "trap logs" are set out along the edges and lanes of Christmas tree fields during the winter. The trap logs are designed to attract parent PSB beetles in spring, when they are searching for suitable brood material. The trap logs are then collected and destroyed well before the new generation can complete development. One insecticide spray is applied in early summer, just as the new generation of beetles begins shoot-feeding. The grower is also expected to scout trees for evidence of infested shoots during the summer and to maintain records of all activities related to PSB management.

Although the program may sound intensive, nearly all aspects can be integrated into standard production practices. Eliminating piles of culled or unsold trees and managing stumps will also help reduce damage to trees caused by weevils and other pests. The single cover spray will control not only PSB, but also coincides with the timing for control of scale, gypsy moth and other important insect pests.

Will it work?

We have good data indicating that the practices prescribed in the Compliance Program will effectively limit PSB populations to very low or even undetectable levels. Cooperating Christmas tree growers in Michigan implemented the program in 10 Scotch pine fields in 1995 and 1996. The fields ranged in size from 2.5 acres up to over 100 acres, and represented a range of management styles. We intensively surveyed these fields and collected data on the percentage of trees with damaged shoots and other variables. On average, less than 5% of the trees in compliance fields had shoots tunneled by PSB in either 1995 or 1996. In most fields, the average was closer to 0 to 2% of the trees had PSB damage.

In contrast, we collected the same data in two Scotch pine "control" fields where brood material was available and no management was undertaken. On average, 38 to 48% of the trees and 40 to 60% of the trees had damaged shoots in 1995 and 1996, respectively. Cliff Sadof, an entomologist at Purdue University, obtained similar results in 7 Indiana Christmas tree fields and 2 control fields.

Advantages of a Compliance Program

The Compliance Program will require a major shift in philosophy for regulatory agencies. Regulatory agencies must move away from a philosophy of attempting to maintain zero risk of introducing PSB, and agree to accept a "minimal risk" of introduction.

Another important point is that the Compliance Program is truly an example of IPM - the focus of the management program is cultural practices such as destruction of brood material and use of trap logs. The Program can be integrated with standard production practices, will reduce other pest problems, and promotes good management.

If successful, the Compliance Program may provide regulatory agencies with a new option for at least some future exotic pests; something between a do-nothing approach and rigid regulations. Given the shrinking budgets of regulatory agencies, the continued expansion in world trade and the likelihood that additional exotic pests will be introduced, a Compliance Program option may be especially important for regions with major shipping ports such as the Great Lakes.

In some ways, PSB is similar to native bark beetles. For example, there are several "secondary" bark beetle species such as *Ips pini* that colonize the same pine logs, slash and cut trees as PSB. These secondary bark beetles rarely attack live trees, unless the trees are severely stressed by drought, defoliation or other problems. In 1988, when a severe summer drought hit much of the Lake States region, bark beetles did overwhelm tree defenses and kill thousands of red pine trees as well as many other tree species. Under most situations, however, bark beetles in the Lake States seldom cause economically important damage.

In years when spring temperatures warm rapidly, PSB may have an advantage over native bark beetles. In these years, PSB may fly 3 to 6 weeks earlier than native species (Haack and Lawrence 1995). However, *Ips pini* and some of the other native bark beetles species have 2 to 3 or more generations a year. This may allow them to take advantage of any brood material not colonized by PSB. In addi-

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The NEWSLETTER of the Michigan Entomological Society is published as four numbers yearly, at irregular intervals. Please send all notes, new insect records, news releases, notices, season summaries, membership inquiries, etc. to Robert Haack, U.S.D.A. Forest Service, Room 220, 1407 S. Harrison Rd., East Lansing, MI 48823. Email: haack@pilot.msu.edu

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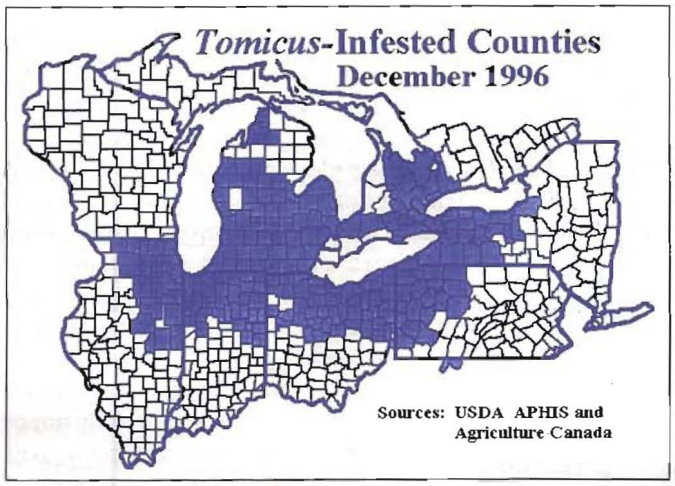
tion, mulitvoltine native bark beetles may be able to take advantage of stressed trees during a hot dry summer (e.g., like in 1988). It's unlikely that PSB, which has only one generation a year, would find many stressed but live pine trees early in the spring.

The shoot-feeding habit of PSB is something that differs from most of our native Scolytid species. However, there are other



scolytid beetles (e.g., *Conophthorus* sp.) that feed in the shoots of pines in the Lake States. There are several Lepidoptera that feed in pine shoots (e.g., *Eucosma gloriola, Rhyacionia buoliana*). These pests, along with Diplodia shoot blight are more abundant and more economically important in both Christmas tree plantations and in pine forest plantations than PSB has been, at least so far.

Currently, we have research projects underway to (a) investigate the interactions among PSB, native bark beetles and native natural enemies in pine forest plantations, (b) obtain a quantitative estimate of shoot damage caused by PSB and other shoot-borers in pine forests, and (c) determine if PSB and native bark beetles compete for brood material.

Literature Cited

Haack, R. A. and R. K. Lawrence. 1995. Spring flight of *Tomicus piniperda* in relation to native Michigan pine bark beetles and their associated predators. Pages 524-535 *in* F.P. Hain et al. (eds), Behavior, population dynamics and control of forest insects, Proceedings of a joint IUFRO Working Party Conference, Maui, Hawaii, 6-11 February 1994. Ohio State University, Wooster, Ohio.

Poor Butterfly

Poor, indeed, is the butterfly, lost
Cut down in her prime by an early frost.
Cold and alone, to die, she must
Becoming ant food and finally dust.

No one to mourn, take note or to see
Or protest the end of her fragile beauty.
Had a collector seen her, just hours before,
Her life would not, necessarily, be o'er.

She might have laid eggs, had she been spared;
Been pampered and fed by someone who cared.
And when she finally reached the end of the line
She could have been preserved for all time.

Robert Bryant
522 Old Orchard Road; Baltimore, MD 21229

MICHIGAN ENTOMOLOGICAL SOCIETY

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