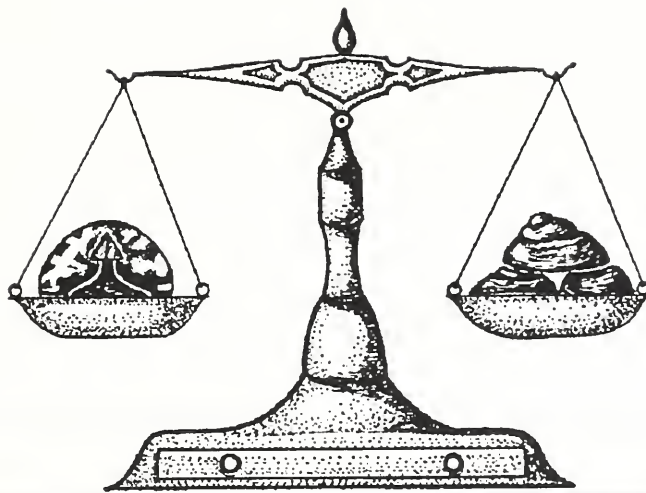


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The Scale



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NOTES FROM THE EDITOR

I must apologize for the delay in finalizing *Scale*; I doubt if any recent number of *Scale* has been completed without that comment. This edition has several new innovations, primarily based on the efforts of the staff at the Virginia Polytechnic Institute and State University. First I want to recognize the very significant contributions of Karen Veilleux who is entering catalog information for us through a contract with VPI. As many of you may know, we have a very large card catalog at Beltsville that includes more than 600,000 cards. Although it is a wonderful resource that many of you have used, the opportunity recently presented itself to begin placing new catalog information in a data base. The listing "Recent Literature" in this "Scale" is a hard copy rendition of one of the databases that are being compiled by Karen. The card catalog will no longer be kept up to date, but instead will be replaced by computer data bases that hopefully will be online at Beltsville. Mary Rhodes and Michael Kosztarab are recognized for preparing the bulk of the remainder of "Scale" by writing articles on IS-SIS-IV, the Sternorrhyncha symposia, minutes of the 10th symposium, and Virginia scale notes; to them a special note of thanks. It would be useful to have information from some of the rest of you.

NEWS FROM BELTSVILLE

Things continue to be hectic at Beltsville. In recent months we have had a very welcome addition to the Coccoidea staff. Gary Miller, who recently finished his dissertation on adult males of soft scales is currently working with me on completing projects that don't seem to come to fruition without additional help. Gary completed his degree under the guidance of Mike Williams, at Auburn University in the state of Alabama, USA. Over the past year we have had a whole series of visitors including Chris Hodgson, Yair Ben Dov, Ting Qui Qin, Mike Williams, Michael Kosztarab, Imre Foldi, and several others. This spring John Davidson organized another scale short course at the University of Maryland with participation by Dick Wilkey, Doug Odermatt, Michael Kosztarab, and myself. It was quite a lively group this time; many of the participants worked well into the evening every night that they had access to the Laboratory. John was tired when it was over.

A NOTE FROM INDIA

R. K. Varshney from the Zoological Survey of India has written the following suggestion: "Since many of the coccids are of economic importance, it will be useful to have a 'List of the (approved) common names' applicable to various coccids of all families. This list showing the and the valid scientific name against each other, may be compiled at your end and published in the next Vol. of THE SCALE, to which additions and corrections can be made in subsequent issues by other workers. I hope you will consider this suggestion.

Editors response: Unfortunately, I do not have the time to take on such a task. I suspect that Yair Ben-Dov has asked someone to write a chapter in his book on soft scales that will encompass common names. Perhaps the Scale could be used as a forum to obtain some general agreement about these names. I might add that a chapter in the Rosen book on armored scales included this information for diaspidids.

REQUEST FOR INFORMATION FROM ISRAEL

In the serial of books on World Crop Pests published by Elsevier in the volume on "Soft Scale (Coccidae)" we are preparing two review papers on the soft scales on tropical fruit pests such as avocado, mango, kiwi, persimmon, guayava, macadamia, lychee, sapota, passion fruit, cashew nuts, etc. We would like to include in this paper information, mainly recent ones regarding these pests (phenology, ecology, natural enemies, and control). We will be much obliged to you if you could send us any relevant paper or and information including extension recommendations and personal communications. From Manes Wysoki, P.O. Box 6, Bet-Dagan 50250, Israel.

Editors note: Please help Dr. Wysoki if you have useful information.

NOTICE OF NEW CATALOG ON COCCIDAE

A note from Yair Ben-Dov, P.O. Box 6, Bet-Dagan 50250, Israel. A catalog of the soft scale insects (Homoptera: Coccoidea: Coccidae) of the world is in the final stages of preparation. It will be an up-to-date (cut off date 1991) database that contains information on synonyms, generic combinations, type data, geographic distribution, host plants, biology, and economic importance of all taxa in the family. The database will include about 1,200 species distributed among about 150 genera. The catalog will be about 500 pages long and include both a list of references and an index to all taxa.

To help us find a publisher, please notify me at the address above if you think that you or your institution might order a copy. The more copies purchased, the cheaper the cost for everyone.

Editors note: Beltsville will buy a copy.

VIRGINIA SCALE NOTES

Mary H. Rhoades

Spring saw the departure of Gema Perez Guerra for Spain, with her PhD defense successfully accomplished and last minute corrections to her dissertation done. Her work was a worldwide revision of the family Dactylopiidae. The nine species currently recognized still stand, and no new species were described. She found the old species descriptions and keys inadequate, and has prepared redescriptions of all species along with complete drawings, and a new key. Also included in her work is the biology of ~~Dactylopius coccus~~ in the Canary Islands, and a proposed phylogenetic tree. When will you be able to see all of this information? Hopefully, we will be able to publish her dissertation as a bulletin in our VPI scale insect series by the end of 1991 or 1992.

Harlan Hendricks, Ph.D. candidate in our lab, is about half finished in redescribing the type species of the genera in the Sphaerococcinae (Pseudococcidae). He is still waiting on some type material to arrive. Based on past work there are about 60 species which are related to the typical genera of the group, but further study may reduce that number. Harlan has found some characteristics not commonly used in keys which seem to be very helpful, and his general feeling is that the Sphaerococcinae is not monophyletic.

Michael Kosztarab ("Dr. K") has less time for scale work, because he inherited part-time administrative work as founding director for our university's Museum of Natural History. He also has been teaching his two graduate courses in Insect Biosystematics during 1990-1991. While in South Africa with Jan Giliomee last March he received a Faculty Recognition Award from the Honor Society of Agriculture, Gamma Sigma Delta.

Our noted colleague from France, Imre Foldi, joined our lab staff for about nine months in 1990 and enriched all of our lives. It is hard to say which was more difficult for him, adapting to life in rural Virginia after being accustomed to Paris, or trying to master English. We do know he made great progress in both tasks, however, and kept quite fit by having only a bicycle for his transportation. A parting note: he never did adapt to Virginia champagne, and two of his favorite English phrases were: "Do you know what I mean?", and "It depends."

The next, more comprehensive, publication from the VPI Coccidology Lab will probably be an identification manual for scale insects of Virginia and neighboring states. Data from card files as well as slide labels will be used to generate the host and distribution records. Although information on biology is scarce, it will be included when possible.

Karen Veilleux, our cataloger, reports that the ongoing scale (and aphid) bibliography and indexing project has been computerized for the last year and a half using Procite, a bibliographic management program. We plan to enter into the database all journal articles, books and conference proceedings (written in English or any foreign language) that have not previously been included in the published bibliography and supplements (through 1985). The database can be searched by author, title, key words, index terms and species names. Short abstracts are included with each record; these include information such as plant host relationships, new species (new genus, new combination) designations, distributions and natural enemies.

To date, 280 articles (or books) have been processed and 2739 species records are included and have been sent to Douglass R. Miller at the USDA-SEL.

Please note that our scale insect research bulletins are available for sale at a minimal cost (e.g., a 200-page bulletin including postage costs \$9.00 when mailed within the USA). Contact us if you are interested in a price list or are willing to offer in exchange new items for our scale insect library.

MINUTES OF ISSIS-VI AND REPORT ON RELATED ACTIVITIES

The Sixth International Symposium of Scale Insect Studies was held in Cracow, Poland, 6th-12th August, 1990. The **Plenary Session** of ISSIS-VI was opened on 7 August at 9:30A.M. with greetings by Rector Piotr Zalewski and Dean Jan Szarek of the Cracow Agricultural University. A medallion was presented to Dr. Michael Kosztarab in recognition of his effort to initiate the symposium series and for his distinguished work in systematics. **Opening remarks** were made by Dr. M. Kosztarab, Honorary President of ISSIS-VI. Dr. Jan Koteja was commended for the outstanding job he did in organizing and conducting the symposium. Dr. M. Kosztarab led the participants in a silent tribute to the two coccidologists who died since our last meeting. Professor John N. Koroneos, who worked at the Aristotelian University of Thessaloniki, died 3 December 1986. His major work was "The Scale Insects of Greece". Dr. Isaac Harpaz, Professor of Entomology at Hebrew University, Rehovot, Israel, died in 1988. He was one of Dr. Bodenheimer's students who distinguished himself in his work on aphids and scales. Later, we discovered that Dr. J. G. Theron, who received his Ph.D under the direction of Dr. Boratynski, had died in 1989. Dr. Theron's major contribution was his comprehensive studies on the male scale insects.

Not counting associated family members, 68 researchers attended the Symposium. An additional 39 researchers sent papers for publication, and as such, participated in absentia. A total of **58 papers** were published and presented in relation to the 1990 ISSIS-VI Meetings. Of these, 44 papers were published in the Proceedings of the Sixth International Symposium of Scale Insect Studies (Part II). The remaining 14+ papers presented will be published in Part I. The proceedings were edited by Dr. Jan Koteja who did an excellent job in arranging and publishing the papers. In addition, 11 posters were presented. The posters were displayed in the main hall until 10 August 1990.

The **presentations** were grouped into 12 sessions with each consisting of from 4 to 7 papers with a 10-15 minute break between sessions. The sessions were co-chaired by: A. H. Amin (Egypt) and C. Hodgson (UK), J. Cox (UK) and C. Hippe (Swiz.), E. Danzig (USSR) and M. Kosztarab (USA), J. Pellizzari-Scaltriti (Italy) and J. Giliomee (S.Afr.), L. Dalla Monta (Italy) and M. Williams (USA), M. Ghabour (Egypt) and E. Sugonyaev (USSR), A. Richards (NZ) and R. Rakauskas (Lith.), G. Watson (UK) and F. Kozar (Hungary), K. Bohidar (India) and J. Wouters (Bel.), S. Myarsteva (USSR) and D. Battaglia (Italy), G. Watson (UK) and D. Shcherbakov (USSR), D. Battaglia (Italy) and J. Merlin (Bel.), and P. Gullan (Aus.) and M. Kosztarab (USA), respectively.

The Introductory Business Meeting was called to order at 12:00P.M. on 7 August 1990 by Dr. Michael Kosztarab who proceeded to announce committee assignments for the session. The Recording Committee chosen consisted of: Dominique Cardon, Penny Gullan, Clare Morales, and Paris Lambdin (Chair.). The Resolution and Site Selection Committee consisted of: J. Pellizzari-Scaltriti, Y. Ben-Dov, P. Gullan, F. Kozar, S. Moharana, R. Sarkisov, M. Williams and D. Williams (Chair.).

Dr. F. Kozar called for contributions to offset the expenses incurred during our meetings through the sale of the Proceedings from the ~~ISSIS-IV~~ meeting at a price of \$20. Other reprints on scale insects along with maps of the city were available in the lobby throughout the meetings. Sign-up sheets were presented for those individuals who wanted to participate in the "All Day" Pieniny Mountain excursion scheduled for 9 August 1990, and trips to the salt mines and Auschwitz. Dr. Koteja announced that morning transportation for participants would be provided from their hotels to the meeting site.

Dr. Y. Ben-Dov proposed that the membership consider the **adoption of the emblem** created for this symposium as the logo for future meetings of the coccidology group. Professor Jan Koteja was commended for the creativity and quality of the logo consisting of a margarodid male overlaid on a parasitized diaspidid female. Dr. M. Kosztarab requested that all sign the cards and attendance sheet located in the lobby during the break. The greeting cards from ISSIS-VI were signed by 54 of the attending participants and sent to colleagues who were unable to attend. Also, copies of the attendance sheet were provided to all as a souvenir of our meeting.

Dr. Koteja called to order the afternoon session and turned the meeting over to the program moderator, Dr. Jan Giliomee. The papers throughout the meetings were well-presented and most informative. The papers ranged in length from 15 to 25 minutes. The quality of the visual aids used with most talks was outstanding, making the sessions quite enjoyable.

An evening meeting, hosted by Professor Koteja and the Staff, was held at the luxurious Academic Senate Hall beginning at 6:00P.M. The meeting provided participants with the opportunity to exchange ideas with one another in an informal setting. The refreshments and food served by the hosts were enjoyed by all.

On 8 August 1990, Prof. Koteja called the meeting to order and made announcements before turning the sessions over to the program moderators. Participants were invited to visit the facilities in the Entomology Department during the noon break, and to be available to take the group photo. Later, participants were treated to a traditional Polish dinner and entertainment at the restaurant located on Kosciuszko Hill by Michael and Matilda Kosztarab. Everyone enjoyed the events and exquisite food and wish

to express their thanks to Michael and Matilda for this most kind and generous act.

On 9 August 1990, the participants enjoyed an "all day" excursion to the Pieniny Mountains National Park where they were able to collect scale insects, sightsee, and enjoy a breathtaking raft-ride down the Dunajec River.

A Round Table Discussion, co-chaired by L. Dalla Monta and M. Kosztarab, was held after the morning session on 10 August 1990 to address current and future concerns of the group. Dr. Kosztarab asked that each of the participants briefly state any current work completed and what they plan to work on in the near future. Also, to inform the group of the work of their colleagues and students who were unable to attend.

The Final Business Meeting: was held at 5:00P.M. on 10 August 1990. D. Williams, Chairman of the Resolution Committee, proposed a resolution to the attending participants as follows: ".that the co-chairman of the Sixth International Symposium of Scale Insect Studies be asked to express their concern about the reduction of taxonomic staff, and in particular, the staff working on scale insects at the Systematic Entomology Laboratory, USDA, Beltsville, MD. USA, and The Natural History Museum, London, and The Commonwealth Scientific and Industrial Research Organization, Canberra, Australia." The resolution was adopted with the following response: "We, the participants of the Sixth International Symposium of Scale Insect Studies, in Crakow, Poland, unanimously adopt this Resolution. A second resolution was read as follows: "The Participants of this Symposium express our heartfelt thanks to the organizers of this Symposium and to the Members of the Local Organizing Committee for making this Symposium a great success. We are particularly grateful to Professor Jan Koteja, Director of the Institute of Applied Zoology, for all his special efforts. We also express our thanks to Rector Piotr Zalewski, Dean Jan Szarek and the Administration of the Krakow Agricultural University, for providing the excellent facilities, and the staff for their kind help throughout the meetings."

Doug Williams made a motion that we adopt the logo for future meetings as created by Professor Jan Koteja and suggested earlier by Dr. Y. Ben-Dov. The motion was unanimously approved by the attending members.

It was suggested that the meeting time of the symposium be announced in various international journals and magazines and to encourage more participation by those working in the area of chemical control of the scale insects. After a discussion, it was concluded that announcements of the meeting are traditionally made in various journals, etc. and that adequate emphasis is provided to insure that all interested workers are notified. It was concluded that no additional emphasis will be given to attracting

papers related to applied aspects of scale insect research as most attending members appear to want to maintain the general nature of the group.

Dr. D. Williams made a motion that Israel be considered as the site for ISSIS-VII. M. Williams moved that we accept the motion which was unanimously approved by the attending members. C. Hodgson offered to look into the possibility of extending an invitation to hold the meetings at Wye College, England in the future.

Dr. Kosztarab announced that the International Advisory Committee for ISSIS-VII would consist of: Drs. Yair Ben-Dov, E. Danzig, P. Gullan, M. Kosztarab, J. Koteja, F. Kozar, D. Matile-Ferrero, R. Varshney, G. Viggiani, and F. Tang. The Sixth International Symposium of Scale Insect Studies was closed by Professor Jan Koteja.

An Evening Farewell Banquet was held in the cafeteria of the College of Forestry beginning at 6:00 P.M. with Professor Jan Koteja performing as Master of Ceremonies. Awards were presented to: Dr. Chris Hodgson, United Kingdom, and Dr. Penny Gullan, Australia, for Best Paper Presentations; to Dr. Clare Morales, New Zealand, for the Best Poster Display; to Dr. Michael and Matilda Kosztarab, United States, for Most Useful Contribution to Scale Insect Studies Bibliography, and to Dr. Paris Lambdin, United States, for Development of New Research Techniques.

On 11 August 1990, participants had the opportunity to divide into special interest groups to discuss issues, techniques and future work on scale insects at the Institute of Applied Zoology, where the Local Organizing Committee provided snacks and refreshments to participants. A comprehensive collection of insects in Baltic Amber was placed on display by Jan Koteja. Later, a visit to the Wieliczka Salt Mine, Wavel Castle, and Oswiecim (Auschwitz) was also made by interested participants.

PHOTOGRAPHED Participants of the VI International Symposium of Scale Insect Studies, Cracow, Poland, August 6-12, 1990

1. Barbara Zak-Ogaza, 2. Michael Kosztarab, 3. Penny Gullan,
4. Mona William Ghabour, 5. K. Bohidar, 6. Ferenc Kozár,
7. Guiseppina Pellizari-Scaltriti, 8. Aharon Yardeni, 9. Gizella Ordogh, 10. Donatella Battaglia, 11. Sadasib Moharana,
12. Anna Dziedzicka, 13. Daniel e matile-Ferrero, 14. Yair Ben-Dov,
15. Michael L. Williams, 16. Chris Hodgson, 17. J. Merlin,
18. Jan Wouters, 19. Dominique Cardon, 20. Gilliam W. Watson,
21. Evelyn Danzig, 22. Douglas J. Williams, 23. Aola M. Richards,
24. _____, 25. Jan Koteja, 26. ? Santi Longo,
27. Gennaro Viggiani, 28. Jennifer Cox, 29. Svetlana Myartseva,
30. Paris L. Lambdin, 31. Abdel Rahman H. Amin, 32. _____,

33. J.A. Vranjic, 34. Mrs. G. Viggiani (Bianca), 35. James O. Howell, 36. ?Marie Rosciszewska, 37. _____, 38. Rimantas Kakauskas, 39. _____, 40. E. Sugonyaev, 41. _____, 42. _____, 43. A. Russo, 44. _____, 45. Elizabeth Podsiadlo, 46. Clare F. Morales (Butcher), 47. Dmitry E. Shcherbakov.

Participants not on photograph: Fritz Bachmann, F. Badowska-Czubik, T., Mrs. Y. Ben-Dov (Jehudith), I. Bielenin, Jan Giliomee, H. Galuszkova, Uri Gerson, Carter Hippe, Matilda Kosztarab, Raiza Kozar, Bozena Lagowska, Laura Dalla Monta, Bewker Oipen, J. Papadopaulos, David Rosen, Mrs. D. Rosen (Mazal), T. Skalski, Z.W. Suski, E Szymula, R. Tondeur, B. Weglarska.

In absentia participants (authors/coauthors of printed manuscripts): R. M. Bink-Moenen, C. Calabretta, P. Camporese, L. De Marzo, Yong-nian Dong, G. E. S. Abo El-Ghar, Y. M. Ezzat, A. I. Farag, Jing-jun Hao, R.L. Hill, Gemal El Deen Hussein, G. Kohler, Yan-hua Liang, Hui-ping Liu, Yu-Sheng Liu, S. Marotta, L.P. Mkrtchian, Samia Nada, S. Nucifora, Ting-Kui Qin, Shaaban Abd Rabo, V. Romano, A. E. Sand, R. N. Sarkisov, B. Schiffers, Wang-gang Shang, Guang-lu Shi, Yu-Liang Shi, Fang-teh Tang, Yuan Tang, R. Tondeur, A. Tranfaglia, R. K. Varshney, Ch. Verstraeten, Ying-ping Xie, R. V. l Yaschenko, V. A. Zakharian, G. I. Zohdi, J. Zravy.

TEN STERNORRHYNCHA SYMPOSIA/CONFERENCES (1966-1990) AND THEIR SIGNIFICANCE FOR RESEARCH

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The ten symposia (Table 1) were held every 2 to 4 years, normally at 3 year intervals during the annual meetings of the Entomological Society of America. The number of papers ranged from 6 to 17, with an average of 12 papers per symposium. The meetings were attended by an average of 35 persons. This count is based on the number of signatures in our attendance book, but it is closer to 60 if we consider the number of persons who entered the rooms late or left early, and thus missed being counted.

What gives an international recognition to the symposium series is that, except once in Denver, all the other nine meetings had international participation, most often from Canada and Mexico, but also from Australia, Chile, England, France, Guatemala, India, Spain, and Venezuela.

It is complimentary for the symposia that many of the attendees of the earlier meetings are returning and have become regulars. For example, Dug Miller is leading this crew with attendance at 9 of the 10 meetings, followed by Manya Stoetzel, Mike Williams, and me with 8, and Jack Beardsley and Jim Howell with 7.

A definite increase in the number of participants occurred since 1984 when the symposia series was expanded to include papers on all Sternorrhyncha and not only on Coccinea. I think this was a wise move, because a number of colleagues work on more than one family of Sternorrhyncha, and also because of the close phylogenetic ties among these groups. It is obvious from Table 1 that the attendance of the symposia, in general, shows an increase whenever the meeting is held in the southern United States. Probably because southern cities have more to offer to visitors in December. One exception to this trend was San Diego in 1981, but this city is far out from the center of gravity of coccidologists. The other exception was Boston, a cold city that attracted at least 59 persons to the meeting in 1987.

The subjects at the ten symposia as given in Table 2 express a dominance of papers in systematics and taxonomy with more than half of the talks on such topics. What is still missing from the symposia are talks on Aleyrodidae and those dealing with embryology, paleontology, and behavior of Sternorrhyncha. To have such papers we may need to invite some foreign speakers to a formal symposium dealing with selected topics. It is also timely to have talks on comparative relationships among the Sternorrhyncha families, but also with other Homoptera and even Heteroptera. Let's use this well established symposia series to further expand our research horizons. It is an excellent trend that papers in ecology are increasing in number and we all look forward to seeing papers on other less known aspects of Sternorrhyncha research.

The significance of the ten symposia for research and researchers of Sternorrhyncha may be summarized in the following:

1. The ten symposia provided a regularly scheduled periodic forum for presenting and discussing the latest achievements in research.
2. We all obtained first hand information on research results that often need 2 to 3 years to be published.

3. We met colleagues at these meetings, and established personal contacts which precipitated close communications among workers.
4. With the established close communications we avoided duplication of research efforts.
5. The presentations called attention to the existing gaps in our knowledge and guided young colleagues to neglected areas of research.
6. By meeting every 2 to 4 years we have achieved excellent collaboration among researchers.
7. Our young colleagues and graduate students were provided with opportunities to:
 - a. present their papers, often their first, to a friendly audience,
 - b. also meet each other and other homopterists in their specialty, some who became their employers.
8. The size of our audience increased after we were able through the symposia to combine presentations of several papers on similar taxa and/or topics.
9. Last, but not least, by giving our papers at a symposium, rather than at a regular ESA session, our chances increased of obtaining official support for participation.

Table 1. SUMMARY OF TEN SYMPOSIA
(1-7 Coccinea; 8-10 Sternorrhyncha)

Symposium No.	Year	Locality	Papers Given	Partici-pants/in Photo	Number of Persons			
					Authors/Representing States	Audience Countries*	Organizer/Moderator	Honoring
Coccinea								
1	1966	Portland, OR	6	307/0	5(10?)	2C	M. Kosztarab/ L. Stannard	
2	1969	Chicago, IL	11	35/18	6(12?)	2M	J. Davidson	
3	1971	Los Angeles, CA	15	42/22	9(16)	4C,Ch,M	R.F. Wilkey	
4	1973	Dallas, TX	16	32/22	7(15)	5E,I,M,V	D.R. Miller	
5	1975	New Orleans, LA	16	43/21	9(18)	2M	J.O. Howell	
6	1979	Denver, CO	9	24/14	6(14)	1	M.L. Williams	
7	1981	San Diego, CA	6	21/16	4(9)	2C	R.J. Gill	
Sternor-rhyncha								
8	1984	San Antonio, TX	17	55/0	11(23)	2M	A.B. Hamon	G.F. Ferris
9	1987	Boston, MA	10	59/15	6(20)	3C,E	M.S. McClure	
10	1990	New Orleans, LA	15	65/22	6(18)	6A,C F,G,S	M. Kosztarab/ D.R. Miller	L.M. Russell

*Abbreviations: A = Australia, C = Canada, Ch = Chile, E = England, F = France, G = Guatemala, I = India, M = Mexico, S = Spain, V = Venezuela

Table 2. SUMMARY OF TALK SUBJECTS AT TEN SYMPOSIA

SYMPOSIUM NO.	YEAR											
	1	2	3	4	5	6	7	8	9	10		
SUBJECT/TAXA	<u>TOTAL</u>											
	SYSTEMATICS/TAXONOMY	62	5	8	7	12	7	4	2	7	5	5
	BIOLOGY/LIFE CYCLE	14	1	1	2	1	2	1	1	1	1	3
	ECOLOGY	8	0	0	0	0	1	3	0	2	2	0
	MORPHOLOGY	8	0	1	2	1	1	1	0	1	0	1
	PHYLOGENY/EVOLUTION	5	0	0	0	1	0	0	1	1	1	1
	GENETICS	2	0	0	1	0	0	0	0	0	0	1
	PHEROMONES	2	0	0	1	0	0	0	1	0	0	0
	BIOLOGICAL CONTROL	3	0	0	2	0	0	0	1	0	0	0
	CHEMICAL CONTROL	3	0	0	0	0	2	0	0	0	1	0
	DYES	1	0	0	0	0	1	0	0	0	0	0
OTHER APPLIED TOPICS	3	0	0	0	0	0	0	0	1	0	2	
COLLECTING/MOUNTING	1	0	0	0	0	1	0	0	0	0	0	
HISTORY	5	0	0	0	0	0	0	0	0	0	2	
ZOOGEOGRAPHY	4	0	1	0	1	1	1	0	1	0	0	
TOTAL NO. OF TALKS	121	6	11	15	16	16	9	6	17	10	15	
INVITATIONAL TALKS	11	6	2	0	2	1	0	0	0	0	0	
ON COCCINEA		0	0	0	0	0	0	0	10	8	9	
ON APHIDOIDEA	*84+27	0	0	0	0	0	0	0	3	2	3	
ON PSYLLOIDEA		2	0	0	0	0	0	0	1	0	1	

*84 talks were given on Coccinea during the Coccinea Symposia (1-7) and 27 more during the Sternorrhyncha Symposia (8-10).

MINUTES OF THE 10th SYMPOSIUM

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The conference was attended by about 65 persons of whom 41 signed the register. A copy of the printed program is given on a separate page. After Manya Stoetzel's presentation about our honoree, Louise M. Russell, a framed Certificate of Appreciation was presented to Louise from the United States Department of Agriculture by Dr. Mary E. Carter, Associate Administrator of the Agricultural Research Service. The Award text was "To Louise M. Russell, for an exemplary career in the field of taxonomy and biosystematics and continuing scientific contributions and commitment to serving American agriculture." The audience expressed their approval with long applause.

During the short break following Doug Pfeiffer's talk, a group photo of 22 specialists was taken by Michael W. Lachance, PhD candidate with Pfeiffer. The participants were invited: 1) to a collecting trip on December 4 to the New Orleans City Park and Greenhouses, organized by Dale K. Pollet; 2) to a reception honoring Louise after the conference.

Paris Lambdin was chosen to organize the 11th Symposium in Baltimore, to be held during the ESA National Conference in 1992. Some may want to reach him with ideas or questions. His address: Dr. Paris L. Lambdin, Department of Entomology and Plant Pathology, P.O. Box 1071, University of Tennessee, Knoxville, TN 37901. Phone: 615/974-7952 or 7135. FAX: 615/974-7136. Please plan now to attend and possibly present a talk. Apparently, if this is communicated in time, and with a theme of general interest, we can upgrade the next meeting to a Formal Conference.

NOTES TO COLLEAGUES AND TO FUTURE SYMPOSIUM ORGANIZERS

The more detailed history of the former symposia is found in the Symposium Register Book. This hard cover black book, 10 1/2" x 14", contains the official program of each symposium, the signatures and addresses of participants, and a group photograph. In addition, other activities are often given, such as organized local collecting trips, informal or formal business, or group meeting, informal reception or just a "bull session."

The book is handed over to the next meeting organizer who makes this available to participants at the meeting, and makes sure that the book is displayed for the curious and is made available for signing by participants. The organizer also lines up group photographer(s), better two than one.

The duties of the organizer start in March or April by requesting titles from possible speakers, and, after receiving enough titles, registering the symposium in May or June preceding the meeting with the ESA Conference Program Chair. Addresses of aphidologists were provided in the past by Manya Stoetzel; for coccidologists by Dug Miller. Normally 60 or more persons are contacted in the U.S.A., Canada, and Mexico in order to receive the average of 15 positive responses. The speakers in the past normally gave a 10 or 20 minute talk (latter for invited presentations) allowing 2 or 4 minutes for discussion. A business meeting follows the formal presentations where suggestions are made on future meeting topics, sites, honorees and organizer(s). A co-moderator is essential because moderators are expected to take turns in handling the slide projector or finding someone to do it. Some colleagues need individual invitations which include the topic of their talk in order to qualify for participation cost reimbursement. We all look forward with high expectations to the next ten successful symposia.

ANNUAL MEETING

ENTOMOLOGICAL SOCIETY OF AMERICA

NEW ORLEANS, LA
DEC. 2-6, 1990



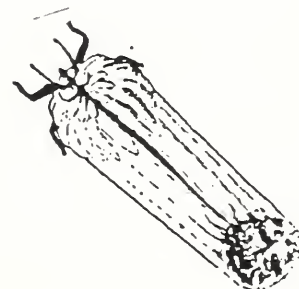
Sunday Evening, December 2

Informal Conference
Biosystematics of Homoptera
Sternorrhyncha
In Honor of Louise M. Russell
Oak Alley
Organizer:
M. Kosztarab
Dept. Entomol.
VPI&SU
Blacksburg, VA 24061
Comoderators:
M. Kosztarab
and
D.R. Miller
Syst. Entomol. Lab.
USDA-ARS
Beltsville, MD 20705

- 7:00 Introduction. M. Kosztarab.
- 7:01 0032 Louise M. Russell: our colleague and her contributions to the study of Homoptera. M.B. Stoetzel, USDA-ARS, Syst. Entomol. Lab., Beltsville, MD 20705.
- 7:12 0033 The life histories of aphids I have known. C.F. Smith, Dept. Entomol., North Carolina State Univ., Raleigh, NC 27695.
- 7:36 0034 Life history of the crapemyrtle aphid, *Tinocallis kahawaluokalani*. D.R. Alverson and R.K. Allen, Dept. Entomol., Clemson Univ., Clemson, SC 29634.
- 7:48 0035 Population trends and damage of hemlock woolly adelgid, *Adelges tsugae* Annand (Adelgidae). M.S. McClure, Connecticut Agric. Exp. Stn., Valley Lab., P.O. Box 248, Windsor, CT 06095.
- 8:00 0036 Needs in North American Psyllidae systematics. D.G. Pfeiffer, Dept. Entomol., VPI&SU, Blacksburg, VA 24061.
- 8:12 0037 Sperm evolution and ultrastructure. W.G. Robinson, Jr., Natl. Inst. Health, NEI, Bldg. 9, Room 1E-104, Bethesda, MD 20892.
- 8:24 0038 Structure and formation of cysts and protective systems in Margarodidae. L Foldi, Dept. Entomol., Museum Natl. Hist. Nat., 45 Rue Buffon, Paris 75005, France.
- 8:36 0039 Economic uses of margarodids in the genus *Llaveia* by indigenous cultures in Central America. M.L. Williams, Dept. Entomol., Auburn Univ., Auburn, AL 36849; and C.M. MacVean, Univ. Valle, Apart. Postal 237, Antigua, Guatemala.

Sunday Evening, December 2

- 8:48 0040 Hawaiian Pseudococcidae: origins and evolution. J.W. Beardsley, Dept. Entomol., Univ. Hawaii, 3050 Mailo Way, Room 310, Honolulu, HI 96822.
- 9:12 0041 The *Pseudococcus affinis* group (Pseudococcidae). D.R. Miller, USDA-ARS, Syst. Entomol. Lab., Beltsville, MD 20705; and W.F. Gimpel, Plant Prot. Sect., Maryland Dept. Agric., 50 Harry S. Truman Pkwy., Annapolis, MD 21401.
- 9:24 0042 An evaluation of the type species of Sphaerococcinae (Pseudococcidae). H.J. Hendricks and M. Kosztarab, Dept. Entomol., VPI&SU, Blacksburg, VA 24061.
- 9:36 0043 Status report on the systematics of cochineal insects (Dactylopiidae). G. Perez-Guerra, Dept. Entomol., VPI&SU, Blacksburg, VA 24061.
- 9:48 0044 Nearctic male soft scales of Eulecanium, *Mesolecanium* and *Sphaerolecanium* (Coccidae). G.L. Miller and M.L. Williams, Dept. Entomol., Auburn Univ., Auburn, AL 36849.
- 10:00 0045 Scale insects on coffee in Guatemala and possible involvement in "Mal de Vinas" disease. C.M. MacVean, Univ. Valle, Apart. Postal 237, Antigua, Guatemala; and M.L. Williams, Dept. Entomol., Auburn Univ., Auburn, AL 36849.
- 10:12 0046 The way we were through ten symposia/conferences and their significance for Sternorrhyncha research (1966-1990). M. Kosztarab, Dept. Entomol., VPI&SU, Blacksburg, VA 24061.
- 10:24 Discussion and business meeting.
- 10:30 End.



Notice of New Catalog on Coccidae

by Yair Ben-Dov

Department of Entomology, The Volcani Center
P.O. Box 6, Bet-Dagan, 50 250 ISRAEL

A catalog of the soft scale insects (Homoptera: Coccoidea: Coccidae) of the world is in the final stages of its preparation. It will be an up to date (cut off date 1991) database that contains information on synonyms, generic combinations, type data, geographic distribution, host plants, biology, and economic importance on all taxa of the family. The database will include about 1200 species distributed among about 150 genera. The catalog will be about 500 pages long and include both a list of references and an index to all taxa.

To help us find a publisher please notify me at the address above if you think that you or your institution might order a copy. The more copies purchased, the cheaper the cost for everyone.

Recent Literature

Abdel-Kareim, A. I. & Kozar, F. 1988. Host plants in relation to the morphology and reproductive biology of Aspidiotus nerii, with description of the hypersensitive reaction of the host plant. (Kulonbozo novenyek hatasa az Aspidiotus nerii termekenysegere, alaktanara es a karositasra adott hiperszenzitiv reakcio.) Kertgazdasag 20(1):55-60. (In Hungarian, English abstract)

Morphology & fecundity of female showed varying characteristics depending on host plant; highest fecundity on watermelon, lowest on asparagus leaves; hypersensitive reactions observed on both oleander & palms.

Agarwala, B. K. & Varshney, R. K. 1988. Coccoids of Tripura - a second list (Homoptera: Coccoidea). (India) Annals of Entomology 6(1):55-56.

22 spp. from 4 families listed; 17 new records for Tripura; 1 record, Thysanofiorinia leei, is recorded for first time in India; 1 new species reported, Octaspidotus tripurensis; hosts.

Alstad, D. N. & Edmunds Jr., G. F. 1989. Haploid and diploid survival differences demonstrate selection in scale insect demes. Evolutionary Ecology 3:253-263.

Nuculaspis californica subdivided into genetically differentiated demes associated with individual pine trees; relative survival of males & females varied with overall mortality, causing a correlation between local densities & surviving sex ratio.

Amin, A. H. 1990. A further survey of the armoured scale insects of Saudi Arabia (Homoptera: Coccoidea: Diaspididae). In Proceedings of the Sixth International Symposium of Scale Insect Studies, Part II. Cracow, Poland: August 6-12, 1990. Cracow: Agricultural University Press; 117-118.

10 armoured scale insects in 8 genera; host plants; Fulaspis is recorded for first time in Saudi Arabia.

Anon. 1989. Wasps rescue cassava [BioBriefs]. BioScience 39(3):216.

International Institute of Tropical Agriculture in Ibadan, Nigeria, is sponsoring large effective Africa-wide project to control Phenacoccus manihoti, a wingless mealybug, with Epidinocarsis lopezi, an Argentine wasp; destructive to cassava.

Ansari, M. A., Pawar, A. D., Murthy, K. R. K. & Ahmed, S. N. 1989. Sugarcane scale, Melanaspis glomerata Green and its biocontrol prospects in Karnataka. (India) Plant Protection Bulletin (Faridabad) 41(1-2):21-23.

Severe pest in India; chemical control found to be too expensive & ineffective; three predatory beetles released & established for control: Pharoscymsus horni, Chilocorus nigritus & Sticholotis madagassa.

Antonelli, A. & Collman, S. 1989. Lecanium Scale. Extension Bulletin (Cooperative Extension, College of Agriculture & Home Economics, Washington State University, Pullman, WA 0746:2 pp.; ill.

Parthenolecanium corni is widespread pest in Washington state; found on fruit trees, dogwood, maple, roses & cherry laurel hedges; field description; description of damage; chemical control.

Avasthi, R. K. & Shafee, S. A. 1987. Indian Pseudococcidae (Homoptera: Coccoidea). Indian Journal of Systematic Entomology 4(1):1-54; ill.

Family defined; 3 subfamilies & 3 tribes recognized; keys given; 48 spp. discussed including 1 new combination (Phenacoccus indicus) & 2 new spp. (Dysmicoccus cucurbitae & Planococcus indicus).

Babu, T. R. & Azam, K. M. 1988. Predation potential of Cryptolaemus montrouzieri Mulsant (Coccinellidae: Coleoptera) in relation to temperature. (India) Journal of Research APAU (Andhra Pradesh Agric. University) XVI(2):108-110.

Host Maconellicoccus hirsutus; daily consumption of prey by predator is higher at 30 degrees C than at 20; overall consumption during larval stage is greater at lower temperature due to extended larval duration; grubs feed on crawlers in absence of eggs of prey; adult males consumed less than females or crawlers.

Badowska-Czubik, T. & Suski, Z. W. 1990. Biology of Phenacoccus aceris and its parasite Anagyrus quercicola. In Proceedings of the Sixth International Symposium of Scale Insect Studies, Part II. Cracow, Poland: August 6-12, 1990. Cracow: Agricultural University Press; 143-144.

Parasitization observed under lab conditions; parasite completely destroyed host population within a few months.

Baekstrom, P. & Li, L. 1990. A onepot procedure for the deoxygenation of alpha,beta-unsaturated ketones and a synthesis of the mealybug pheromone. (Sweden) Synthetic Communications 20(10):1481-1485.

An improved reaction that achieves the deoxygenation of alpha,beta-unsaturated ketone with concomitant migration of the double bond is introduced, and applied to the synthesis of racemic 3-acetoxy-2,6-dimethyl-1,5-heptadiene, a pheromone component of Pseudococcus comstocki.

Battaglia, D. 1988. Biological note on Coccidencyrtus dynaspidioti sp. n. (Hymenoptera: Encyrtidae), parasite of Dynaspidiotus britannicus (Newstead) (Homoptera: Diaspididae). (Notizie biologiche sul Coccidencyrtus dynaspidioti sp. n. (Hymenoptera: Encyrtidae), parassitoide di Dynaspidiotus britannicus (Newstead) (Homoptera: Diaspididae).) (Italy) Bollettino del Laboratorio di Entomologia Agraria "Filippo Silvestri" 45:149-165; ill. (In Italian, Italian & English abstract)

Dynaspidiotus britannicus parasitized by this new sp. of encyrtid.

Battaglia, D. 1989. Biological report of Coccidencyrtus dynaspidiotus, n. sp. (Hymenoptera: Encyrtidae), parasite of Dynaspidiotus britannicus (Newstead) (Homoptera: Diaspididae). (Notizie biologiche sul Coccidencyrtus dynaspidioti sp. n. (Hymenoptera: Encyrtidae), parassitoide di Dynaspidiotus britannicus (Newstead) (Homoptera: Diaspididae).) Bollettino del Laboratorio di Entomologia Agrar. "Filippo Silvestri" 45:149-165; ill. (In Italian, English abstract)

Biology & ethology of this endoparasitoid.

Battaglia, D. & Tranfaglia, A. 1990. Natural enemies of Aulacaspis rosae in Italy. In Proceedings of the Sixth International Symposium of Scale Insect Studies, Part II. Cracow, Poland: August 6-12, 1990. Cracow: Agricultural University Press; 145-146.

6 parasitic hymenopterans reared from A. rosae collected in Southern Italy: Arrhenophagus chionaspidis, Adelencyrtus aulacaspidis, Zaomma microphaga, Encarsia citrina, Pteroptrix dimidiata & Archenomus longiclava.

Baxendale, R. W. & Johnson, W. T. 1990. Efficacy of summer oil spray on thirteen commonly occurring insect pests. Journal of Arboriculture 16(4):89-94. (In English, English & French abstract)

Sunspray 6E Plus is highly effective against 9 pests of woody ornamentals including Adelgis laricis, Pulvinaria innumerabilis, Eulecanium cerasorum, Asterolecanium variolosum, Lecanium corni & Neolecanium cornuparvum; phytotoxicity data noted.

Bedford, E. C. G. 1989. Red Scale on Citrus. Pretoria, South Africa: Dept. of Agriculture & Water Supply. 4 pp.; ill. (Farming in South Africa, Citrus, H.2.)
[Leaflet insert for 3-hole binder.]

Review of Aonidiella aurantii; citrus hosts; economic importance; damage; life cycle; seasonal incidence; dispersion; natural enemies; biological & chemical control.

Ben-Dov, Y. 1990. Zoogeographical affinities of Middle Eastern mealybugs. In Proceedings of the Sixth International Symposium of Scale Insect Studies, Part II. Cracow, Poland: August 6-12, 1990. Cracow: Agricultural University Press; 95-99.

83 pseudococcid spp. reported from Middle East; 11% known in Palearctic; 48 spp. or 60% of Middle East origin; 18 spp. or 20% expanded from conterminous regions; 17 spp. or 20% cosmopolitan & obvious introductions.

Ben-Dov, Y. & Cox, J. M. 1990. The identity of five species of scale insects (Hem., Homoptera, Coccoidea), living on ornamental plants, originally described by P. F. Bouche. Entomologist's Monthly Magazine 126:79-84.

Taxonomic interpretations given for Coccus bromeliae, Vryburgia amaryllidis, new comb., Planococcus citri & Spilococcus mamillariae, new comb; synonymy established; brief biographical sketch of Bouche & list of 33 coccid spp. originally described by him with their present status.

Ben-Dov, Y. & Matile-Ferrero, D. 1989. Taxonomy and nomenclature of five hitherto inadequately-known genera of mealybugs (Homoptera: Coccoidea: Pseudococcidae). Systematic Entomology 14:165-178; ill.

Type-sp. of 4 genera of Pseudococcidae studied; Fonscolombia Lichtenstein redefined; Fonscolombia graminis assigned to Pseudococcidae; Laboulbenia synonymized with Antonina; Tetrura synonymized with Coccura; Brevennia redefined; Ripersia (Brevennia) tetrapora redescribed; Ripersia asphodeli redescribed; Asphodelococcus meoconcitae synonymized with A. asphodeli.

Bhatti, S. 1990. A new monophlebine genus (Homoptera: Coccoidea: Margarodidae: Monophlebinae) on Melaleuca L. in Australia. Invertebrate Taxonomy 3:495-516; ill.

New genus Melaleucoccus erected in tribe Monophlebulini; 4 new spp. from Australia: M. phacelopilus, M. notoporosus, M. hirtipectus & M. nodosus; all feed on Melaleuca; descriptions of adult females & males; sexual dimorphism & behavioral differences noted; biology; key.

Bhatti, S. & Gullan, P. J. 1990. New Margarodid species (Homoptera: Coccoidea: Margarodidae: Monophlebinae) from New Guinea. Invertebrate Taxonomy 3:877-911; ill.

3 new genera & 11 new spp. from New Guinea described in tribe Monophlebulini; adult females of all & some 1st instar nymphs described; keys; hosts; distribution maps.

Bhumannavar, B. S. & Jacob, T. K. 1989. Psoraleococcus nr. multiporti (Morrison) on mango on an Andaman Island. (India) FAO Plant Protection Bulletin 37(3):134.

Report of first occurrence of infestation of this sp. on mango.

Biassangama, A., Le Ru, B., Iziquel, Y., Kiyindou, A. & Bimangou, A. S. 1989. Insects associated with the cassava mealybug, Phenacoccus manihoti (Homoptera: Pseudococcidae), in the Congo, five years after the introduction of Epidinocarsis lopezi (Hymenoptera: Encyrtidae). (L'entomocenose infeodee a la cochenille du manioc, Phenacoccus manihoti (Homoptera: Pseudococcidae), au Congo, cinq ans apres l'introduction d'epidinocarsis lopezi (Hymenoptera: Encyrtidae).) Annales de la Societe entomologique de France (N.S.) 25(3):315-320. (In French, French & English abstract)

In the 5 years covered by this study the number of predators has increased from 8 to 21 spp.; 9 mentioned for first time here; number of parasitoids of predators has increased from 3 to 14 spp. (11 mentioned for first time here).

Bielenin, I. & Weglarska, B. 1990. Main cocoon-forming gland of female Gossyparia spuria (Mod.) (TEM investigation) (Homoptera: Coccoidea: Eriococcidae). In Proceedings of the Sixth International Symposium of Scale Insect Studies, Part II. Cracow, Poland: August 6-12, 1990. Cracow: Agricultural University Press; 55-56.

Cellular & chemical description of gland; process of formation.

Bink-Moenen, R. M. 1990. Comparisons within Sternorrhyncha (Homoptera: Homoptera). In Proceedings of the Sixth International Symposium of Scale Insect Studies, Part II. Cracow, Poland: August 6-12, 1990. Cracow: Agricultural University Press; 31-36.

The superfamilies Aphidoidea, Coccoidea, Psylloidea & Aleyrodoidea forming the series Sternorrhyncha within the Homoptera are compared with respect to their number, distribution, morphology, bionomics, ontogenesis, paleontology, etc; although the Coccoidea and Aphidoidea are more closely related (similar) than other groups, strong arguments for their sister group relationships are still lacking.

Bower, C. C. 1989. The phenology of Comstockaspis perniciosus (Comstock) (Homoptera: Diaspididae) in an apple orchard at Orange, New South Wales. Journal of the Australian Entomological Society 28:239-245.

Two full generations of this sp. occurred with possible third; minimum of 741 degree-days required to complete a generation; chemical control.

Buckley, R. C. & Gullan, P. J. 1990. Coccids in ants' nests inside live plants in Australia and Papua New Guinea (Homoptera: Coccoidea: Coccidae). In Proceedings of the Sixth International Symposium of Scale Insect Studies, Part II. Cracow, Poland: August 6-12, 1990. Cracow: Agricultural University Press; 82.

11 spp. found; mostly from PNG rainforest; questions raised about relationships between ants, host plants & coccids.

Buckley, R. C., Gullan, P. J., Fletcher, M. J. & Taylor, R. W. 1990. New ant Homopteran interactions from tropical Australia. Australian Entomol. Mag. 17(2):57-60.

12 previously unrecorded associations between ants and Homoptera are reported from the Kimberley region of tropical northwestern Australia; 4 scale insects included; host plants given.

Bullington, S. W., Kosztarab, M. & Jiang, G.-Z. 1989. II. Adult Males of the Genus Chionaspis (Homoptera: Coccoidea: Diaspididae) in North America. In Studies on the Morphology and Systematics of Scale Insects -- No. 15 (Contribution No. 2 to a National Biological Survey). Blacksburg, VA: Virginia Agricultural Experiment Station. p.127-184; ill. (VAES Bulletin 88-2.)

Morphological descriptions & illustrations for 12 spp. of Chionaspis; key; 7 morphs described for first time; evolutionary hypothesis presented based on Ward's Minimum Variance Cluster Analysis.

Burden, D. J. & Hart, E. R. 1990. Parasitoids of Chionaspis pinifoliae (Homoptera: Diaspididae) in Iowa. Great Lakes Entomologist 23(2):93-97.

Aphytis diaspidis, Coccobius varicornis & Marietta pulchella parasitize C. pinifoliae on Pinus sylvestris; rates of parasitization with corresponding temperatures.

CAB International Institute of Entomology. 1989. Pseudococcus comstocki (Kuwana). Distribution Maps of Pests Map no. 338 (revised):3 pp.; ill. (Series A, Agricultural.)

Map showing distribution of this sp. worldwide; countries listed with references to records; synonymy; common names; host plants.

Cadahia, D. 1989. Hemiberlesia pitysophila Takagi (Homoptera, Diaspididae) lethal plague of Pinus massoniana Lamb. in China. (Hemiberlesia pitysophila Takagi (Homoptera, Diaspididae) plaga letal de Pinus massoniana Lamb. en China.) Bol. Sanid. Veg. Plagas 15(4):343-363; ill. (In Spanish, English abstract)

Has caused catastrophic damage; probably introduced on Christmas trees; some success with biological control due to introduction of entomophagous enemies.

Calabretta, C. & Nucifera, S. 1990. Mercetaspis sphaerocarphae and Nilotaspis retamae on Genistinae in Sicily (Homoptera: Coccoidea: Diaspididae). In Proceedings of the Sixth International Symposium of Scale Insect Studies, Part II. Cracow, Poland: August 6-12, 1990. Cracow: Agricultural University Press; 103-105.

These 2 spp. recorded on same host, Retama raetam; found in "African coast" of Sicily, at sea level; genus Mercetaspis new for Italy; genus Nilotaspis new for Europe.

Claps, L. E. 1987. Life cycles of Cornuaspis beckii (Newmann, 1869) and Insulaspis gloverii (Packard, 1869) under insectary conditions (Insecta; Homoptera; Coccoidea; Diaspididae). (Caracteristicas del ciclo biologico de Cornuaspis beckii (Newmann, 1869) e Insulaspis gloverii (Packard, 1869) en condiciones de insectario (Insecta; Homoptera; Coccoidea; Diaspididae).) (Argentina) CIRPON, Revista de Investigacion V(1-4):7-16. (In Spanish, Spanish and English abstract)

Two common species on citrus in northwestern Argentina; length of life cycles observed.

Clarke, S. R., DeBarr, G. L. & Berisford, C. W. 1989. The life history of Toumeyella pini (King) (Homoptera: Coccidae) in Loblolly pine seed orchards in Georgia. The Canadian Entomologist 121(10):853-860. (In English, English & French abstract)

3 generations a year in South Georgia; females develop on needles of Pinus taeda; most common parasite of males & females: Coccophagus lycimnia; predator of females: Laetilia coccidivora.

Conti, B. 1987. Temperature effects on development rate of immature stages of Saissetia oleae (Oliv.) 1. Duration of the egg development under constant temperature conditions. (Influenza della temperatura sullo sviluppo degli stadi preimaginali della Saissetia oleae (Olivier). I. Durata dello sviluppo dell-uovo a temperature costanti.) Frustula Entomologica New Series 10(23):73-81. (In Italian, English abstract)

Temperature range of 18-28 degrees C creates best conditions for embryo of this sp.

Danzig, E. M. 1990. The main evolutionary trends in the armoured scales. In Proceedings of the Sixth International Symposium of Scale Insect Studies, Part II. Cracow, Poland: August 6-12, 1990. Cracow: Agricultural University Press; 37-40.

The Diaspididae are the most specialized scale insects, characterized by the development of a pygidium with special types of glands which produce the armour, & by excretion of honeydew; represented by Aspidiotinae & Diaspidinae, each with several tribes; composition & taxonomic status of the Rugaspidiotini are unclear; presumably this group is an artificial assemblage.

Danzig, E. M. & Matile-Ferrero, D. 1990. Neopulvinaria innumerabilis: a pest of vine in Europe (Homoptera: Coccinea: Coccidae). In Proceedings of the Sixth International Symposium of Scale Insect Studies, Part II. Cracow, Poland: August 6-12, 1990. Cracow: Agricultural University Press; 131-132.

New synonymy established; well known in New World; probably introduced to Europe from America.

David, H., Nandagoal, V. & Gould, Y. S. 1989. Preliminary studies on the sugarcane scale insect Aulacaspis madiunensis (Zehntner). (India) Entomon 14(1/2):33-38; ill.

Pest of sugarcane in Australia; originally from Java; now found in India; also on grasses & sugarcane in Formosa, on Erianthus arundinaceus in Ceylon & on grasses in China; description of damage; biology.

De Marzo, L., Romano, V. & Tranfaglia, A. 1990. Types of the female reproductive system in some scale insects (Homoptera: Coccoidea). In Proceedings of the Sixth International Symposium of Scale Insect Studies, Part II. Cracow, Poland: August 6-12, 1990. Cracow: Agricultural University Press; 41-46; ill.

Characteristics & evolutionary trends of 8 different types of genital systems in female Coccoidea; list of taxa examined with remarks on corresponding types.

Devnath, S. 1987. Fusarium coccophilum (Desm) Wr. & Rg? An interesting entomogenous fungus recorded on Hemiberlesia rapax (Comstock), a scale insect pest of tea. (India) Two and a Bud 34(29-30); ill.)

First record of this fungus on this scale sp.; course of infection described.

Drea, J. J. 1990. 2.2.2 Other Coleoptera. In Armoured Scale Insects, Their Biology, Natural Enemies and Control, Vol. B. D. Rosen, ed. Amsterdam: Elsevier. p. 41-49; ill. (World Crop Pests)

Seven families that prey on armored scale insects reviewed.

Drea, J. J. 1990. 2.2.3 Neuroptera. In Armoured Scale Insects, Their Biology, Natural Enemies and Control, Vol. B. D. Rosen, ed. Amsterdam: Elsevier. p. 51-59; ill. (World Crop Pests)

Four families of scale predators reviewed.

Drea, J. J. & Gordon, R. D. 1990. 2.2.1 Coccinellidae. In Armoured Scale Insects, Their Biology, Natural Enemies and Control, Vol. B. D. Rosen, ed. Amsterdam: Elsevier. p. 19-40; ill. (World Crop Pests.)

Biology; review & key of genera predaceous on armored scales; table of host genera for each species of Coccinellidae; natural enemies; pathogens.

Dziedzicka, A. 1990. Scale insects of citrus fruits imported to Poland (Homoptera: Coccinea). In Proceedings of the Sixth International Symposium of Scale Insect Studies, Part II. Cracow, Poland: August 6-12, 1990. Cracow: Agricultural University Press; 106.

13 spp. mentioned; many imported from Mediterranean; many are important pests in greenhouses.

Ehler, L. E. 1989. Operations on Scutellista cyanea Motsch. (Hymenoptera: Pteromalidae). Pan-Pacific Entomologist 65(2):151-155.

Parasite of Saissetia oleae; relatively common on olive in northern California; not sufficiently successful in controlling population.

Eisner, T. & Silberglied, R. E. 1988. A chrysopid larva that cloaks itself in mealybug wax. Psyche 95:15-19; ill.

Pseudococcid Plotococcus eugeniae recorded on Eugenia in association with larvae of the Chrysopid Ceraeochrysa cincta; camouflaged by packets made from wax taken from their prey; seemed to prefer younger stages of P. eugeniae.

Emehute, J. K. U. & Egwuatu, R. I. 1990. Effects of field populations of cassava mealybug, Phenacoccus manihoti, on cassava yield and Epidinocarsis lopezi at different planting dates in Nigeria. Tropical Pest Management 36(3):279-281.

Cassava has significantly higher yields when planted early in the season, compared to late planting; E. lopezi could be used effectively to reduce field populations of P. manihoti if released at low densities in late cassava crop.

European and Mediterranean Plant Protection Organization (EPPO). 1989. EPPO data sheets on quarantine organisms. EPPO List A2. Unaspis yanonensis (Kuwana) (Homoptera: Diaspididae). (Fiches informatives OEPP sur lest organismes de quarantaine.) Bulletin OEPP/EPPO Bulletin 19(no. 176): 721-724. (In English & French)

Synonymy; common names; found only on all types of Citrus spp. except the specifically Japanese hybrids known as Natsudaidae and on Citrus junos; widespread distribution includes Burma, China, India, Indonesia, Japan, Korea, Malaysia, Pakistan, Philippines, Thailand & Vietnam; extent of damage; morphology; biology; control.

Evans, H. C. & Prior, C. 1990. 2.1 Entomopathogenic fungi. In Armoured Scale Insects, Their Biology, Natural Enemies and Control, Vol. B. D. Rosen, ed. Amsterdam: Elsevier p. 3-17; ill. (World Crop Pests.)

Historical review of fungi as pathogens of Diaspididae; taxonomy, biology & biological control; host species.

Ezzat, Y. M. 1990. Vernacular names of Egyptian scale insects (Homoptera: Coccoidea). In Proceedings of the Sixth International Symposium of Scale Insect Studies, Part II. Cracow, Poland: August 6-12, 1990. Cracow: Agricultural University Press; 11-12.

Author promotes use of common names for scales, after approval by an appropriate committee, & in addition to scientific names.

Fabres, G., Nenon, J.-P., Kiyindou, A. & Biassangama, A. 1989. Acclimatization of exotic entomophages to control cassava mealybug in the Congo. (Reflexions sur l'acclimatation d'entomophages exotiques pour la regulation des populations de la cochenille du manioc au Congo.) Bulletin de la Societe zoologique de France 114(1):43-48. (In French, French & English abstract)

This sp. is phytophagous pest; introduced into Congo from South America; Epidinocarsis lopezi & Hyperaspis raynevali introduced for biological control; indigenous enemies include Anagyrsus sp., Hyperaspis senegalensis hottentotta & Exochomus flaviventris.

Fabres, G. 1989. "Carrying capacity" and the regulation of phytophagous insects: the example of the Cassava Mealybug in the Congo. (Influence de la "capacite limite" dans la regulation de l'abondance d'un phytophage: le cas de la Cochenille du Manioc au Congo.) Bulletin de la Societe Zoologique de France 114(1):35-42. (In French, French & English abstract)

Populations of Phenacoccus manihoti were surveyed on cassava during two dry seasons in the Congo; large reduction in the abundance of this pest at the beginning of the rainy season was accompanied by changes in the age structure of the population, with a net reduction in the proportion of immature individuals; it is suggested that this is due to over exploitation of the food plant.

Facknath, S. 1989. Biological control of sugar-cane pests in Mauritius: a case study. Insect Science and its Application 10(6):809-813. (In English, English & French abstract)

43 identified insect pests of sugar cane in Mauritius; very few indigenous; most are exotic; 102 spp. of parasites & predators; all pests controlled biologically by use of natural enemies, resistant cane varieties, sex pheromones, etc.; 90% of all cultivated land planted in sugar cane.

Fallek, C., Yablonka, G., Dahan, R., Mordechai, S. & Berlinger, M. J. 1988. Winter sprays to control the Hall Scale and the Olive Scale (Diaspididae) on deciduous fruit trees in Israel. Hassadeh 69(3):454-455. (In Hebrew, English abstract)

Sprays applied in spring and early summer often failed; better control in winter while trees dormant & population mainly gravid females.

Farag, A. I., Abo El-Ghar, G. E. S., Zohdi, G. I. & Sand, A. E. 1990.

Predatory efficiency, development and reproduction of Agistemus exsertus on juvenoid-treated scale insects (Acarina, Stigmaeidae -- Homoptera: Coccoidea). In Proceedings of the Sixth International Symposium of Scale Insect Studies, Part II. Cracow, Poland: August 6-12, 1990. Cracow: Agricultural University Press; 153-156.

2 juvenoids in water emulsions applied to citrus trees & giant reed (Arundo donax) infested by natural populations of Lepidosaphes beckii & Asterolecanium bambusae, respectively; eggs used as prey to A. exsertus; increase in predation resulted.

Fernandes, I. M. 1987. Contribution to knowledge of some coccids of Guine-Bissau. (Contribuicao para o conhecimento da quermofauna da Guine-Bissau.) Garcia de Orta, Ser. Zool. 14(1):31-37; ill. (In Portuguese, English & French abstract)

Review of Aspidiotus destructor, Lepidosaphes beckii, Pinnaspis strachani, Coccus hesperidum, Coccus viridis & Parasaissetia nigra; descriptions; hosts.

Foldi, I. 1989. 1.1.2.4 The scale cover. In Armoured Scale Insects, Their Biology, Natural Enemies and Control, Vol. A. D. Rosen, ed. Amsterdam: Elsevier. p. 43-54; ill.

Structure & chemical composition; sexual dimorphism; gregarious scales; functions as protection against physical & chemical environmental aggressions.

Foldi, I. 1989. 1.1.3 Internal anatomy. In Armoured Scale Insects, Their Biology, Natural Enemies and Control, Vol. A. D. Rosen, ed. Amsterdam: Elsevier. p. 65-80; ill.

Anatomy of diaspidids not well known, especially at ultrastructural level; distinct from other scale insect families; reviews digestive (female mouthparts, salivary glands, salivary pump & alimentary canal), excretory, respiratory, nervous, reproductive, wax gland & pheromone-producing gland systems.

Foldi, I. 1989. 1.2.3.1 Oocytes and spermatozoa formation. In Armoured Scale Insects, Their Biology, Natural Enemies and Control, Vol. A. D. Rosen, ed. Amsterdam: Elsevier. p. 199-204; ill.

Discusses morphological & cytological modifications during development of oocyte; detailed ultrastructural data on morphological & cytological changes during spermiogenesis known only in Aonidiella aurantii.

Foldi, I. 1989. 1.3.4 Moulting and scale-cover formation. In Armoured Scale Insects, Their Biology, Natural Enemies and Control, Vol. A. D. Rosen, ed. Amsterdam: Elsevier. p. 257-265; ill.

Moulting takes extraordinary amount of time during post-embryonic development (8 of 11 days for Aonidiella aurantii); scale-cover formation discussed in Aspidiotine & Diaspidine females & males; evolutionary trend; aberrant scale-cover formation.

Foldi, I. 1988. Mealybugs: poorly known but exciting insects. (Les Cochenilles: des insectes mal connus mais passionnants.) (France) Insectes 70(3):4-7; ill. (In French)

Nontechnical discussion of importance & fascination of mealybugs; reproduction; differentiation between sexes; behavior & defense techniques; destruction towards plants & utility for people.

Foldi, I. 1989. Scale insects injurious to vineyards in South America. (Les cochenilles nuisibles a la vigne en Amerique du Sud (Homoptera: Coccoidea).) Annales de la Societe entomologique de France (N.S.) 25(4): 411-430; ill. (In French, French & English abstract)

14 spp. discussed; redescription; synonymy; hosts; distribution; biology; economic importance; control.

Gillespie, A. T. & Claydon, N. 1989. The use of entomogenous fungi for pest control and the role of toxins in pathogenesis. (Great Britain) Pesticide Science 27:203-215.

Examines biology of entomogenous fungi, their need for moisture & the ability of some to produce insecticidal toxins in submerged culture; Saissetia coffeae is mentioned as host for Verticillium lecanii.

Gonzalez, R. H. 1989. Management of kiwi fruit pests in Chile: 1. Degradation of residues of the insecticides Chlorpyrifos and Phosmet. (Manejo de plagas del kiwi en Chile: 1. Degradacion de residuos de los insecticidas Chlorpyrifos y Phosmet.) (Chile) Revista Fruticola 10(2):35-43; ill. (In Spanish, English abstract)

Aspidiotus neri, Hemiberlesia rapax & H. lataniae are scale pests discussed; phenology reviewed to assess better timing of insecticide applications.

Habibian, A. & Assadi, H. B. 1989. Some complementary studies of biological control with Pseudaulacaspis pentagona (Targ. Tozz.) in Guilan Province (Iran). In Progress and Prospects in Insect Control, edited by N. R. McFarlane. Reading, United Kingdom: Sept. 18-20, 1989. (Monograph -- British Crop Protection Council, No. 43.) p. 249.

Pest on mulberry; parasitized by Encarsia berlesei at rate of 30%; biology; other natural enemies include Aphytis sp. at 5% rate of parasitism, Aspidiotiphagus citrinus & Chilocorus bipustulatus.

Harris, K. M. 1990. 2.2.4 Cecidomyiidae and other Diptera. In Armoured Scale Insects, Their Biology, Natural Enemies and Control, Vol. B. D. Rosen, ed. Amsterdam: Elsevier. p. 61-66; ill. (World Crop Pests.)

The only species of Diptera that are definitely known to be specialised predators on armored scale insects belong to this family.

Hennessey, R. D., Neuenschwander, P. & Muaka, T. 1990. Spread and current distribution of the cassava mealybug, Phenacoccus manihoti (Homoptera: Pseudococcidae), in Zaire. Tropical Pest Management 36(2):103-107.

Occurs in region with dry season of at least 90 days and low green-leaf biomass towards end of dry season; populations reach catastrophic levels during prolonged periods of drought; found on cassava; exotic parasitoid Epidinocarsis lopezi controls outbreaks.

Hodgson, C. J. 1990. The scale insect genus Houardia Marchal (Homoptera: Coccidae). *Systematic Entomology* 15:219-226; ill.

Description of genus & 3 spp.; key; 1 new sp. (H. mozambiquensis); poorly known genus apparently restricted to Africa.

Hoebeke, E. R. & Wheeler, A. G. 1991. Anthribus nebulosus, a Eurasian scale predator in the eastern United States (Coleoptera: Anthribidae): notes on biology, recognition, and establishment. *Proceedings of the Entomological Society of Washington* 93(1):45-50; ill.

This predator released in Virginia in late 1970's to control scales; found on Physokermes hemicryphus on Picea pungens sp.

Jalaluddin, M. & Mohanasundaram, M. 1989. Control of the coconut scale Aspidiotus destructor Sign. in the nursery. (India) *Entomon* 14(3-4): 203-206.

Fish oil rosin soap at 2.5% used for control in nursery.

Jensen, P. B. & Sharkov, A. V. 1989. Revision of the genus Trichomasthus (Hymenoptera: Encyrtidae) in Europe and Soviet Asia. *Entomologica Scandinavica* 20:23-54.

Trichomasthus is defined & key to 19 Palaeartic sp. provided; 5 new spp. from Soviet Far East described; 8 scale spp. mentioned as hosts.

Kohler, G. 1990. Some aspects of speciation processes in scale insects. *In* *Proceedings of the Sixth International Symposium of Scale Insect Studies, Part II*. Cracow, Poland: August 6-12, 1990. Cracow: Agricultural University Press; 18.

Speciation processes scarcely studied compared to aphids; formation of biotypes through geographical & ecological separation can be expected.

Kosztarab, M. 1990. Why study the scale insects? (Homoptera: Coccinea). *In* *Proceedings of the Sixth International Symposium of Scale Insect Studies, Part II*. Cracow, Poland: August 6-12, 1990. Cracow: Agricultural University Press; 7-11.

Reasons include the great need for taxonomic work (only 20-25% of spp. have been described); lack of knowledge of biology, ecology, paleontology & males; importance as pests; value in controlling certain noxious weeds; importance in propagation of plant pathogens; uniqueness of sexual dimorphism; metamorphosis; reproduction; polymorphism; adaptation; ecology; etc.

Kosztarab, M., O'Brien, L. B., Stoetzel, M. B., Deitz, L. L. & Freytag, P. H. 1990. Problems and needs in the study of Homoptera in North America *In* *Systematics of the North American Insects and Arachnids: Status and Needs*. M. Kosztarab & C. W. Schaefer, Eds. Blacksburg, VA: VA Polytechnic Institute & State University. pp. 119-145. (VA Agricultural Experiment Station Information Series, 90-1.)

Review by suborder (3) of general gaps in knowledge of families, genera & spp.; increase in Homopteran population & negative effects due to atmospheric pollution create urgent need for research; 7 pp. devoted to scales; brief status report on taxonomy; location of major collections; review of families.

Koteja, J. 1990. Fossil scale insects: questions and problems (Homoptera: Coccinea). In Proceedings of the Sixth International Symposium of Scale Insect Studies, Part II. Cracow, Poland: August 6-12, 1990. Cracow: Agricultural University Press; 30,78,138.

About 350 scale insect fossils, impressions & amber inclusions, of various origin, are being studied; only a few of them have been described & classified; radiation of archeococcids must have occurred before the Cretaceous time, & that of the neococcids during this epoch.

Koteja, J. 1989. Note on Kiritshenkella Borchsenius (Homoptera, Coccinea). (Poland) Polskie Pismo Entomologiczne [Bulletin Entomologique de Pologne] 59:299-301. (In English, Polish abstract)

Review of taxonomic changes and references to redescriptions of several species of this genus.

Kozar, F. 1990. 3.4.2 Sampling and census-taking. In Armoured Scale Insects, Their Biology, Natural Enemies and Control, Vol. A. D. Rosen, ed. Amsterdam: Elsevier. p. 341-347.

Importance of sampling (forecasting of infestations); sampling methods; distribution surveys; ecological studies; plant protection studies; quarantine examinations; list of species with corresponding plant parts most appropriate for sampling.

Kozar, F. 1990. 3.9.7 Deciduous fruit trees. In Armoured Scale Insects, Their Biology, Natural Enemies and Control, Vol. A. D. Rosen, ed. Amsterdam: Elsevier. p. 593-602.

This group of plants (Prunus, Pyrus, Malus, Juglans, Ribes, Rubus, Vitis, etc.) is most seriously damaged by armored scale insects; occur worldwide, especially in temperate zones; major species and their status discussed; biological & chemical control; quarantine measures.

Kozar, F. 1990. Chapter 3.4 Forecasting and monitoring infestations: 3.4.1 Forecasting In Armoured Scale Insects, Their Biology, Natural Enemies and Control, Vol. A. D. Rosen, ed. Amsterdam: Elsevier. p. 335-340.

Major categories of forecasting (distribution and spatial forecasting, introduced species, native species, population dynamic forecasting, phenological forecasting, warning and monitoring systems, and forecasting of damage); Quadraspidiotus perniciosus used as example.

Kozar, F. 1990. Why are there so few scale insects? (Homoptera: Coccoidea) In Proceedings of the Sixth International Symposium of Scale Insect Studies, Part II. Cracow, Poland: August 6-12, 1990. Cracow: Agricultural University Press; 13-17.

About 6000 spp. currently known; actual number much greater; speciation limited by low number of generations & low dispersal ability; no signs of coevolutionary processes between plants & scale insects can be traced.

Kozar, F. & Scaltriti, G. P. 1989. A new mealybug from Italy: Coccidohystrix zangherii sp. n. (Homoptera: Coccoidea, Pseudococcidae). Redia 72(2): 507-511; ill. (In English, English & Italian abstract)

Adult female described; key given to separate it from the other 7 species of this genus.

Krishnamoorthy, A. 1989. Effect of cold storage on the emergence and survival of the adult parasitoid Leptomastix dactylopii How. (Hym., Encyrtidae). (India) Entomon 14(3-4):313-318.

Specific, solitary endoparasitoid of Planococcus citri; effective for biological control.

Lagowska, B. 1990. Scale insects of the Roztocze in Poland (Homoptera: Coccinea). In Proceedings of the Sixth International Symposium of Scale Insect Studies, Part II. Cracow, Poland: August 6-12, 1990. Cracow: Agricultural University Press; 101-102.

88 spp. collected; 68 new for region; 4 new for Poland; 1 new to science; biology; ecology; zoogeography.

Lambdin, P. L. 1990. Development of the Black Willow Scale, Chionaspis salicisnigrae (Homoptera: Diaspididae), in Tennessee. Entomological News. 101(5):288-292.

Biology of this species on Salix nigra; other hosts include Amelanchier canadensis, Cornus pubescens, C. asperifolia, Fraxinus americana, Populus canadensis, P. candicans, P. deltoides, P. grandidentata, P. tremuloides, Salix interior & S. nigra.

Liu, Y.-S. & Shi, Y.-L. 1990. Systematic status of Asterodiaspis with description of a new species (Homoptera: Asterolecaniidae) In Proceedings of the Sixth International Symposium of Scale Insect Studies, Part II. Cracow, Poland: August 6-12, 1990. Cracow: Agricultural University Press; 85-89; ill.

More than 150 spp. of scales from 50 genera from 10 families reported from Fagaceae in China; Asterodiaspis discussed & compared with Neocasterodiaspis; Asterodiaspis biformis, n.sp. is described & illustrated.

Liu, Y. & Shi, Y. 1989. Systematic study of the genus Asterodiaspis in Shandong. Journal of Shandong Agricultural University (3):39-50; ill. (In Chinese, English abstract)

Five species reviewed including 1 newly recorded and two new species; descriptions; comparisons; hosts; distribution within China.

Liu, Y. & Zhang, Z. 1989. A new species of Asterodiaspis in China. Journal of Shandong Agricultural University (2):23-26; ill. (In Chinese, English abstract)

Description of Asterodiaspis changbaishanensis; found on Quercus robur; similar to A. japonica.

Liu, Y. & Zhang, Z. 1990. A study of the dimorphism of Asterodiaspis variabile (Russell) (Homoptera, Coccoidea, Asterolecaniidae). Journal of Shandong Agricultural University (1):31-36; ill. (In Chinese, English abstract)

Descriptions of stem & leaf forms.

Lo, P. L. & Blank, R. H. 1989. A survey of armoured scale species (Hemiptera: Diaspididae) in kiwifruit orchards. New Zealand Entomologist 12:1-4.

2661 specimens from 7 districts identified; collected from sprayed & unsprayed vines; Hemiberlesia rapax was most widespread on kiwifruit, followed by Aspidiotus nerii & H. lataniae.

Longo, S. & Russo, A. 1990. New records on scale insects of Calabria and Sicily (Italy) (Homoptera: Coccoidea) In Proceedings of the Sixth International Symposium of Scale Insect Studies, Part II. Cracow, Poland: August 6-12, 1990. Cracow: Agricultural University Press; 113-116.

Data on distribution & host plants given for 1 sp. of Kermesidae, 2 spp. of Coccidae & 6 spp. of Pseudococcidae.

Longo, S. & Russo, A. 1988. Survey of olive scale fauna in Sicily and Calabria. (Rilievi sulla composizione della coccidiofauna dell'olivo in Sicilia e Calabria.) (Italy) Att XV Congr. naz. ital. Ent., L'Aquila 513-520. (In Italian, English abstract)

16 species found; 2 from Pseudococcidae, 1 from Asterolecaniidae, 3 from Lecaniidae & 10 from Diaspididae; 6 recorded for the first time in Italy.

Marotta, S. & Tranfaglia, A. 1990. New and little known species of Italian scale insects (Homoptera: Coccoidea). In Proceedings of the Sixth International Symposium of Scale Insect Studies, Part II. Cracow, Poland: August 6-12, 1990. Cracow: Agricultural University Press; 107-112.

New data presented on 16 spp.; 2 new spp. to Italy; distribution; economic importance.

McLaren, G. F. 1989. Control of oystershell scale Quadraspidiotus ostreaeformis (Curtis) on apples in Central Otago. New Zealand Journal of Crop and Hort. Sci. 17:221-227.

Current recommendations for control of this species compared; best results obtained using oil and chlorpyrifos EC at green tip with or without chlorpyrifos in early January.

McLaughlin, J. R. 1990. Behavioral response of male white peach scale to the sex pheromone, (R,Z)-3,9,-dimethyl-6-isopropenyl-3,9-decadien-1-ol propionate and corresponding alcohol. Journal of Chemical Ecology 16(3):749-756.

Males of Pseudaulacaspis pentagona in Florida differ from those in France in their responses to putative pheromonal chemicals presented in a lab bioassay; specific chemical differences described; effects on bait used for trapping.

Mendel, Z., Dunkelblum, E. & Robison, D. 1990. Sexual behavior of Matsucoccus josephi (Homoptera: Margarodidae) asynchronous adult male emergence and release of female sex pheromone. (Israel) Journal of Chemical Ecology 16(7):2341-2352.

Daily emergence patterns of M. josephi adults and 3rd-instar male larvae raised on artificially infested saplings of Pinus halepensis were determined; relationship with emission of pheromones observed.

Mendel, Z., Saphir, N. & Robison, D. 1990. Mass rearing of the Israeli Pine Bast Scale, Matsucoccus josephi (Homoptera: Margarodidae), with notes on its biology and mating behavior. (Israel) Annals of the Entomological Society of America 83(3):532-537. (Agricultural Research Organization, 2566-E, 1988 series.)

Major pest of pines; biology; hosts; procedures developed to enhance study of control measures; effects of temperature on development.

Merlin, J., Gregoire, J.-C., Dolmans, M., Speight, M. R., Pasteels, J. M. & Verstraeten, C. 1988. Preliminary comparison of two scale insect species on broad-leaved trees in Western Europe. (Belgium) Med. Fac. Landbouww. Rijksuniv. Gent. 53/3a:1153-1158.

Pulvinaria regalis in U.K. & Eupulvinaria hydrangeae in Belgium are recent pests on amenity trees; thrive in urban conditions; life histories; population dynamics; host plants.

Mienis, H. K. 1989. The marsh slug Deroceras laeve (Mollusca, Gastropoda) feeding on the Florida wax scale Ceroplastes floridens (Insecta, Rhynchota) in Israel. Zeitschrift fur Angewandte Zoologie 76(3):377-378. (In English, German abstract)

Mention of other slugs feeding on order Rhynchota; hand-collecting, distribution of Metaldehyde pellets & use of beer traps recommended for control.

Miller, D. R. 1991. The scales, scale insects or coccoids. In Immature Insects, Volume 2. Stehr, Frederick W., Ed. Dubuque, IO: Kendall/Hunt pp. 90-107; ill.

General description; ecological & economic importance; biology; distribution; preservation techniques; review of 15 families.

Miller, G. L. & Williams, M. L. 1990. Tests of male soft scale insects (Homoptera: Coccidae) from America north of Mexico, including a key to the species. Systematic Entomology 15:339-358; ill.

Tests (pupal covers) of 28 spp. of male Coccidae, representing 15 genera from America north of Mexico, are described & illustrated; all exhibit morphological differences; key given.

Moharana, S. 1990. Cytotaxonomy of Coccids (Homoptera: Coccoidea). In Proceedings of the Sixth International Symposium of Scale Insect Studies, Part II. Cracow, Poland: August 6-12, 1990. Cracow: Agricultural University Press; 47-54.

Karyomorphometrical analyses of idiograms of 71 spp. of coccids of India; attempt made to trace out the presumed phylogram of coccid families on the basis of chromosome numbers.

Molyneux, R. J., Campbell, B. C. & Dreyer, D. L. 1990. Honeydew analysis for detecting phloem transport of plant natural products: implications for host-plant resistance to sap-sucking insects. *Journal of Chemical Ecology* 16(6):1899-1909.

Plant secondary constituents in phloem analysed; information about transport or compartmentalization of secondary plant metabolites may be obtained by these methods; technique can also be applied to study of translocation of systemic herbicides.

Morales, C. F. & Hill, R. L. 1990. Vedalia: the New Zealand contribution (Homoptera: Coccinea: Monophlebidae). In *Proceedings of the Sixth International Symposium of Scale Insect Studies, Part II*. Cracow, Poland: August 6-12, 1990. Cracow: Agricultural University Press; 129-130.

A significant part of the population of Vedalia, used to control Icerya purchasi on citrus in California, was of New Zealand origin.

Myartseva, S. N. 1990. Encyrtid complexes on mealybugs in the arid zone of Middle Asia. In *Proceedings of the Sixth International Symposium of Scale Insect Studies, Part II*. Cracow, Poland: August 6-12, 1990. Cracow: Agricultural University Press; 147-148.

87 pseudococcid spp. in Middle Asia; 34 encyrtid genera; 23 genera (36 spp.) associated with mealybugs; usually 8-10 spp. with 1 host sp.; on Tamarix, Haloxylon, Phragmites & Erianthus.

Nada, S., Rabo, S. A. & Hussein, G. E. Deen. 1990. Scale insects infesting mango trees in Egypt (Homoptera: Coccoidea). In *Proceedings of the Sixth International Symposium of Scale Insect Studies, Part II*. Cracow, Poland: August 6-12, 1990. Cracow: Agricultural University Press; 133-134.

23 spp. belonging to 5 families found in Egypt; heaviest infestations from Chloropulvinaria psidii, Insulaspis pallida & Kilifia acuminata; chemical control discussed.

Nalepa, C. A. & Meyer, J. R. 1990. The seasonal history of the white peach scale (Homoptera: Diaspididae) and its Hymenopteran natural enemies in North Carolina. *Journal of Entomological Science* 25(2):303-310.

This sp. has 3 peaks of crawler emergence & a partial fourth generation observed; parasites include Encarsia berlesi, Aphytis proclia & Marietta carnesi.

Njeru, E. I. 1990. Control of coffee scale insect pests in Kenya -- a review. *Kenya Coffee* 55(641):801-804.

9 scale species on coffee are discussed; economic importance; integrated control; chemical control; distribution & pest status.

Pallutt, W. 1988. Recommendations for the use of insecticides and acaricides on crops under glass and plastics. (Empfehlungen zur Anwendung von Insektiziden und Akariziden in Kulturen unter Glas und Plasten.) Nachrichtenblatt für den Pflanzenschutz in der DDR 42(9):179-184; ill. (In German, Russian & English abstract)

Chemical control for whitefly, aphids, other sucking insects & red spiders.

Paparatti, B. & Fabozzi, R. 1988. A new parasite of the pine processionary caterpillar (Thaumetopoea pityocampa (Den. et Schiff.), Lepidoptera: Thaumetopoeidae). (Un nuovo parassita della processionaria del pino (Thaumetopoea pityocampa (Den. et Schiff.), Lepidoptera: Thaumetopoeidae).) Informatore fitopatologico 38(9):45-48; ill. (In Italian, English abstract)

Observations in two different environments; descriptions of symptoms; list of hosts for parasite includes 2 Coccidae (Coccus hesperidum & C. viridis).

Patel, I. S., Dodia, D. A. & Patel, S. N. 1990. First record of Maconellicoccus hirsutus (Homoptera: Pseudococcidae) as a pest of pigeonpea (Cajanus cajan). Indian Journal of Agricultural Sciences 60(9):645.

This sp. was found on undetermined shrub; crawlers on lower surface of leaves or entire surface; honeydew secreted by nymphs and adults supported growth of sooty mould on leaves & shoots, giving blackish appearance.

Pellizzari-Scaltriti, G. & Camporese, P. 1990. List of the Italian Diaspididae (Homoptera: Coccidea). In Proceedings of the Sixth International Symposium of Scale Insect Studies, Part II. Cracow, Poland: August 6-12, 1990. Cracow: Agricultural University Press; 91-94.

Italian Diaspididae comprise 107 spp.; 19 were found only in greenhouses &/or on imported plants & fruits.

Phillips, P. A., Bekey, R. S. & Goodall, G. E. 1987. Argentine ant management in cherimoyas. California Agriculture (Mar/Apr):8-9, ill.

Iridomyrmex humilis interferes with biol. control of Pseudococcus adonidum on cherimoya crop in Calif.; damage to fruit quality; sticky band treatment most effective control but labor intensive; also chem. control (Lorsban 4E) recommended.

Podsiadlo, E. 1990. The species concept of Asterodiaspis variolosa (Ratzeburg 1870) (Homoptera: Asterolecaniidae). In Proceedings of the Sixth International Symposium of Scale Insect Studies, Part II. Cracow, Poland: August 6-12, 1990. Cracow: Agricultural University Press; 90.

It is suggested that Asterodiaspis quercicola (Bouche) is a synonym of A. variolosa (Ratzeburg); discontinuous individual variation recorded within colonies of this sp. is interpreted as polymorphism.

Prasad, Y. K. 1989. The role of natural enemies in controlling Icerya purchasi in South Australia. *Entomophaga* 34(3):391-395. (In English, English & French abstract)

Natural-enemy-exclusion experiments conducted at monthly intervals to confirm role of natural enemies.

Qin, T. K. & Gullan, P. J. 1990. The Australian mealybugs (Homoptera: Pseudococcidae) of Xanthorrhoea (Xanthorrhoeaceae). *Invertebrate Taxonomy* 3:759-769; ill.

First time record of Xanthorrhoea as host-plants for Australian mealybugs (key provided); 3 new spp. are Dysmicoccus waustensis, D. saustralis & Pseudococcus xanthorrhoeae; adult females & a 3rd instar female described.

Qin, T. K. 1990. The Australian cottony soft scales (Homoptera: Coccoidea: Pulvinariini). *In* Proceedings of the Sixth International Symposium of Scale Insect Studies, Part II. Cracow, Poland: August 6-12, 1990. Cracow: Agricultural University Press; 79-81.

All Australian spp. are retained in the genus Pulvinaria because phylogenetic relationships between genera in the Pulvinariini are still unknown; existing generic framework is considered inadequate; 13 spp. recognized in Australian fauna; 10 new synonyms proposed.

Ragusa, S. & Russo, A. 1988. Citrus pests in Calabria (southern Italy). *In* Proceedings of the Sixth International Citrus Congress, edited by R. and Mendel, K., Eds. Goren. Tel Aviv, Israel: March 6-11, 1988. Philadelphia/Rehovot: Balaban Publishers; p. 1307-1312.

Among the pests listed are 14 scale spp. & their parasites.

Ragusa, S. & Russo, A. 1989. The arthropods of the Anona's in Calabria. (Gli artropodi dell'annona in Calabria.) *L'informatore* 45(29):71-74; ill. (In Italian)

Fauna of this area includes Planococcus citri, Aonidiella aurantii, Aspidiotus nerii, Parthenolecanium persicae, Hemiberlesia rapax & Ceroplastes rusci on Anona cherimolia.

Rajavel, D. S., Mohan, R. & Venugopal, M. S. 1989. Biological control of coffee green scale. (India) *Indian Coffee* 43(10):15-16.

Coccus viridis (Green) is serious pest in all coffee growing areas; description of damage, including promotion of sooty mould & fungi; chemical control with fungicides.

Raspi, A. & Antonelli, R. 1987. Notes on the Leucaspis pusilla Loew (Homoptera Diaspididae), harmful to pine trees in Tuscany. (Alcune note sulla Leucaspis pusilla Loew (Homoptera Diaspididae), parlatorino dannoso sui pini in Toscana.) *Frustula Entomologica New Series* 10(23): 127-152; ill. (In Italian, English abstract)

Ethology of this sp.; widespread on coasts of Tuscany on Pinus pinaster, P. pinea & P. halepensis; biology.

Robison Jr., W. G. 1989. 1.2.3.2 Sperm ultrastructure, behaviour, and evolution. In Armoured Scale Insects, Their Biology, Natural Enemies and Control, Vol. A. D. Rosen, ed. Amsterdam: Elsevier. p. 205-220; ill.

Unique sperm features include filamentous structure with no distinct head, middle-piece or tail, and lack of important cell organelles such as acrosome, centrioles or mitochondria; 25 spp. mentioned.

Russo, A., Magnano di San Lio, G., Cacciola, S. O. & Asero, C. 1988. Verticillium lecanii as a possible control agent of citrus black scale in Sicily. In Proceedings of the Sixth International Citrus Congress, edited by R. and Mendel, K., Eds. Goren. Tel Aviv, Israel: March 6-11, 1988. Philadelphia/Rehovot: Balaban Publishers; p. 1341-1347.

Conidial suspensions of the fungus were sprayed on orange trees infested with Saissetia oleae; in some cases up to more than 80% of scales were parasitized; heavier infestations observed during winter.

Sarkisov, R. N., Mkrtchian, L. P. & Zakharian, V. A. 1990. Reduction of the area of Porphyrophora hameli and the problem of its preservation (Homoptera: Margarodidae). In Proceedings of the Sixth International Symposium of Scale Insect Studies, Part II. Cracow, Poland: August 6-12, 1990. Cracow: Agricultural University Press; 123-124.

The Ararat cochineal is valued in Armenia for its natural dye, carmine; desalting of soils & loss of its host plants has resulted in reduction of its population; means are being sought to reestablish it.

Shah, A. H., Jhala, R. C. & Patel, C. B. 1988. Bioefficacy of Aldicarb and BPMC against mango scales and its residues on/in mango fruits. (India) Gujarat Agricultural University Research Journal. 13(2):19-22.

Results indicated that aldicarb at the rate of 100 or 150 g/tree and BPMC at 0.05 % concentration were found effective treatment after 15 days of their application; residues below detectable level on/in mango fruits 30 days after application; Aspidiotus destructor & Ceroplastes actiniformis were scales observed.

Shcherbakov, D. E. 1990. Extinct four-winged ancestors of scale insects (Homoptera: Sternorrhyncha). In Proceedings of the Sixth International Symposium of Scale Insect Studies, Part II. Cracow, Poland: August 6-12, 1990. Cracow: Agricultural University Press; 23-29.

A peculiar Homopteran family Naibiidae (Triassic - ? Paleocene) known from both impressions and amber inclusions demonstrates some rather weak coccid apomorphies combined with aphid habitus; presumed ancestors of scales; both aphids & coccids derivable from Archescytinidae via Permian Boreoscytidae and Permotriassic Pincombeidae.

Shen, S. & Xie, X. 1990. Study of the bionomics of Beijinga utila Yang. an important natural enemy of scale insects. Scientia Silvae Sinicae. 26(1):30-38; ill. (In Chinese, English abstract)

This ectoparasite & monoparasite attacks Eulecanium gigantea & E. kuwanai.

Stimmel, J. F. 1990. Balsam twig aphid, Mindarus abietinus Koch. Regulatory Horticulture 16(1):25-27; ill. (Entomology Circular No. 136, PA Dept. Agric., Bureau of Plant Industry.)

Description, life history, damage & chemical control of M. abietinus.

Sugonyaev, E. S. 1990. Phenology of coccids -- a basis of adaptative strategies of wasp parasites in the Northern Hemisphere. In Proceedings of the Sixth International Symposium of Scale Insect Studies, Part II. Cracow, Poland: August 6-12, 1990. Cracow: Agricultural University Press; 135-137.

Coccids of moderate zone are monocyclic; their parasites infest 2 or more host instars, diapause in various stages, change the host spp. or modify the structure & behavior of their larvae; in hypoarctic zone coccids are sparse & have prolonged life cycle; their parasites are able to accelerate the metamorphosis of the host & become "local monophages".

Tachikawa, T. & Gordh, G. 1987. A new genus and species of Encyrtidae (Hymenoptera: Chalcidoidea) parasitic on Idiococcus (Homoptera: Pseudococcidae) in Japan. Transactions of the Shikoku Entomological Society 18(3-4):305-309; ill. (In English)

New parasite of Idiococcus bambusae (Idiococcophilus Tachikawa & Gordh, n.gen. & Idiococcophilus japonicus n.sp.) described from Japan; on Pleioblastus variegatus.

Takagi, S. 1990. Disc pores of Diaspididae: microstructure and taxonomic value (Homoptera: Coccoidea). (Japan) Insecta Matsumurana New Series 44: 81-112; ill.

Disc pores observed in scanning electron microscope and described.

Takagi, S. 1990. SEM observations on the tests of some Diaspididae. (Japan) Insecta Matsumurana New Series 44:17-80; ill.

The tests of 10 species of the family Diaspididae were observed in a scanning electron microscope.

Takagi, S., Pong, T. Y. & Ghee, K. S. 1990. Genus Ulucooccus novum: a key form to diaspidid evolution (Homoptera: Coccoidea). (Malaysia) Insecta Matsumurana New Series 44:1-15; ill.

New genus and 2 new species described: U. gombakensis & U. danumensis; represent an early evolutionary stage within the Diaspididae.

Takahashi, S., Hajika, M., Takabayashi, J. & Fukui, M. 1990. Oviposition stimulants in the coccoid cuticular waxes of Aphytis yanonensis De Bach & Rosen. (Japan) Journal of Chemical Ecology 16(5):1657-1665.

This parasitic wasp introduced into Japan; found on Unaspis yanonensis and other coccoids; behavior.

Tang, F.-t., Dong, Y.-n., Hao, J.-j., Xie, Y.-p., Liang, Y.-h., Liu, H.-p., Tang, Y., Zhang, W.-g. & Shi, G.-l. 1990. Test formation in Ceroplastes japonicus and invention of Cerocide an effective pesticide against the wax scales (Homoptera: Coccoidea: Ceroplastina). In Proceedings of the Sixth International Symposium of Scale Insect Studies, Part II. Cracow, Poland: August 6-12, 1990. Cracow: Agricultural University Press; 159-162.

Cerocide, a wax resolving insecticide, tested in lab & field experiments against C. japonicus in China; mortality increased to 73-81% compared to 12-18% with other insecticides & 77-100% when Cerocide is combined with other insecticides; residual on host plant does not exceed 10 days; winter treatments more effective than spring ones.

Tang, F.-t., Hao, J.-j., Xie, Y.-p. & Tang, Y. 1990. Family group classification of Asiatic Coccidae (Homoptera: Coccoidea, Coccidae). In Proceedings of the Sixth International Symposium of Scale Insect Studies, Part II. Cracow, Poland: August 6-12, 1990. Cracow: Agricultural University Press; 75-77.

Classification based on adult female adaptative characteristics; 4 (1 new) subfamilies, 7 (1 new) tribes & 133 (4 new) subtribes proposed; keys to family rank taxa.

Tao, C. C. 1989. List of scale insects from Taiwan, Republic of China. Bulletin Taichung Dist. Agric. Improv. Stn. (No. 22):57-70. (In Chinese, English abstract)

315 species listed from 12 families.

Thorarinsson, K. 1990. Parasitization of the cottony-cushion scale in relation to host size. Entomophaga 35(1):107-118. (In English, French abstract)

Measurements of body length of Icerya purchasi; length found to be imperfect indicator of stage; parasite loads increase with load size; natural enemies used successfully for biological control in California include Rodolia cardinalis & Cryptochaetum iceryae.

Tondeur, R., Schiffers, B., Verstraeten, C. & Merlin, J. 1990. Chemical methods in an integrated action against Eupulvinaria hydrangeae in Belgium (Homoptera: Coccoidea: Coccidae). In Proceedings of the Sixth International Symposium of Scale Insect Studies, Part II. Cracow, Poland: August 6-12, 1990. Cracow: Agricultural University Press; 157-158.

6 contact herbicides tested against this sp. under lab conditions & 6 systemic ones applied to big trees by means of a prototype injector commander system.

Tremblay, E. 1989. 1.3.3 Stylet formation and renewal. In Armoured Scale Insects, Their Biology, Natural Enemies and Control, Vol. A. D. Rosen, ed. Amsterdam: Elsevier pp. 255-256; ill.

Review of interest in this part of scale anatomy; Pseudaulcaspis pentagona & Pulvinariella mesembryanthemi studied.

Tremblay, E. 1989. 1.3.6 Endosymbionts. In Armoured Scale Insects, Their Biology, Natural Enemies and Control, Vol. A. D. Rosen, ed. Amsterdam: Elsevier. 275-283; ill.

Endosymbiotic adaptations in the Coccoidea seem to have little comparative value as far as the evolutive status of main lineages is considered, because of possible convergences; however, they can be important sources of taxonomic information for the definition of larger taxa; further research needed.

Tu, W.-G., Wu, W.-J. & Lee, P.-P. 1988. Planococcini of Taiwan (Homoptera: Pseudococcidae). Annual of Taiwan Museum 31:71-101; ill. (In Chinese, English abstract)

11 spp. in 5 genera are redescribed; new records for Crisicoccus pini, Planococcus dorsospinosus & Planococcus pacificus; 2 new combinations; keys to all genera & some spp.; synonymy; distribution; hosts.

Ullah, G. M. R. & Chowdhury, S. H. 1988. Biology of an Iceryine scale, Crypticerya jacobsoni (Green) (Margarodidae: Coccoidea). (Bangladesh) Chittagong University Studies, Part II: Science 12(2):17-29; ill.

Description of this pest reared on guava; host plants; biology; natural enemies.

Valand, V. M., Patel, J. I. & Mehta, D. M. 1989. Biology of brown scale (Saissetia coffeae) on pointed gourd (Trichosanthes dioica). (India) Indian Journal of Agricultural Sciences 59(9):610-611.

Damage described; biology; insect reared on Cucurbita maxima.

Van Alphen, J. J. M. & Neuenschwander, P. 1989. Insect invasions: the case of the Cassava mealybug and its natural enemies evaluated. Entomologist 108(1/2):38-55.

Behavioral ecological traits of Phenacoccus manihoti and natural enemy Epidinocarsis lopezi discussed; causes extensive damage in African cassava belt; survival of E. lopezi during wet season contributes to its success as biological control agent.

Varshney, R. K. 1990. A synoptic updated catalogue of lac insects (Homoptera: Coccoidea: Tachardiidae) In Proceedings of the Sixth International Symposium of Scale Insect Studies, Part II. Cracow, Poland: August 6-12, 1990. Cracow: Agricultural University Press; 71-74.

2 subfamilies, 8 genera & 77 spp. listed with locations.

Vidyasagar, P. S., Abdulla Koya, K. M., Devasahayan, S. & Premkumar. 1989. Record of wax scale Ceroplastes floridensis Comstock (Homoptera: Coccidae) infesting clove seedlings in Kerala, India. Entomon 14(3-4): 359-360; ill.

Review of scale spp. previously found on Eugenia caryophyllus; C. floridensis now recorded on this host for first time; description of damage; chemical control.

- Viggiani, G. 1990. Biology and natural enemies of Gossyparia spuria in southern Italy. In Proceedings of the Sixth International Symposium of Scale Insect Studies, Part II. Cracow, Poland: August 6-12, 1990. Cracow: Agricultural University Press; 139-142.
- Discusses biology & natural enemies of this sp. in southern Italy; dominant parasitoid is Coccophagus gossypariae.
- Viggiani, G. & Laudonia, S. 1988. Some sensorial complexes of the male antenna of three species of the genus Encarsia Forster (Hymenoptera: Aphelinidae) related to courtship phases. (Su alcuni complessi sensoriali delle antenne maschili di tre specie del genere Encarsia Forster (Hymenoptera: Aphelinidae) e il loro rapporto con le fasi dell'accoppiamento.) (Italy) Bollettino del Laboratorio di Entomologia Agraria "Filippo Silvestri" 45:67-75; ill. (In Italian, Italian & English abstract)
- Found on Quadraspidiotus perniciosus which was found on apple trees (Red Delicious).
- Vranjic, J. A. 1990. Taxonomy and host plant relations of gum tree scale insects (Homoptera: Coccoidea: Eriococcidae). In Proceedings of the Sixth International Symposium of Scale Insect Studies, Part II. Cracow, Poland: August 6-12, 1990. Cracow: Agricultural University Press; 83-84.
- Eriococcus coriaceus & E. confusus are common gum tree pests; widely distributed; taxonomy poorly known; discussion of host-plant relations; associated with sooty molds.
- Wang, T.-c. & Zhang, X.-j. 1990. A new species of Trionymus Berg on Zea mays L. from China (Homoptera: Coccoidea: Pseudococcidae). Acta Entomologica Sinica 33(4):450-452. (In Chinese, English abstract)
- Description & affinities of Trionymus agrestis, new sp.
- Watson, G. W. & Cox, J. M. 1990. Identity of the African coffee root mealybug, with descriptions of two new species of Planococcus (Homoptera: Pseudococcidae). (Africa) Bulletin of Entomological Research 80:99-105; ill.
- Planococcus fungicola, new sp. (from Kenya), P. radicum, new sp. (from Nigeria & Tanzania) & P. lilacinus (Cockerell) described; hosts; biology; synonymy.
- Wouters, J. 1990. Dyestuff analysis of scale insects by high performance liquid chromatography. In Proceedings of the Sixth International Symposium of Scale Insect Studies, Part II. Cracow, Poland: August 6-12, 1990. Cracow: Agricultural University Press; 61-70.
- High performance liquid chromatography (HPLC) used to quantitatively determine dye components; technique can also be used on textiles.

Yardeni, A. & Rosen, D. 1990. Wind dispersal and pattern of colonization of Ceroplastes floridensis on citrus in Israel. In Proceedings of the Sixth International Symposium of Scale Insect Studies, Part II. Cracow, Poland: August 6-12, 1990. Cracow: Agricultural University Press; 125-128.

Airborne crawlers captured by sticky traps placed in an uninfested citrus grove before older instars could be detected developing on twigs & leaves; number captured correlated with population density of the invading generation in the grove; latter were randomly distributed; those of following generation (mostly those that had matured in the grove), showed a higher density & negative binomial distribution; when exposed to an air current, crawlers assumed characteristic dispersal posture that facilitated their becoming airborne.

Yaschenko, R. V. 1990. Distribution and host-plants of Porphyrophora polonica (Homoptera: Coccinea: Margarodidae). In Proceedings of the Sixth International Symposium of Scale Insect Studies, Part II. Cracow, Poland: August 6-12, 1990. Cracow: Agricultural University Press; 119-122.

Range of this sp. includes steppe & forest-steppe zones of Eurasia from south of France to East Mongolia; hosts plants belong to 17 families.

Zakharian, V. A. 1990. Phospholipid contents in Porphyrophora hameli (Homoptera: Margarodidae). In Proceedings of the Sixth International Symposium of Scale Insect Studies, Part II. Cracow, Poland: August 6-12, 1990. Cracow: Agricultural University Press; 57-59.

7 main phospholipids have been discovered in this sp.; same occur in adult female & eggs, although in different proportions.

Zohdi, G. I., Farag, A. I., Abo El-Ghar, G. E. S. & Sand, A. E. 1990. Effect of scale insects as prey on development and reproduction of Aqistemus exsertus (Homoptera: Coccoidea -- Acarina: Stigmaeidae). In Proceedings of the Sixth International Symposium of Scale Insect Studies, Part II. Cracow, Poland: August 6-12, 1990. Cracow: Agricultural University Press; 149-152.

This mite was reared on eggs of Lepidosaphes beckii, Asterolecanium bambusae & Icerya aegyptica; also on the mite Tetranychus urticae; consumption greater, period of development shorter & fecundity higher when reared on T. urticae as compared to scales.

Zrzavy, J. 1990. Evolution of Hemiptera: an attempt at synthetic approach. In Proceedings of the Sixth International Symposium of Scale Insect Studies, Part II. Cracow, Poland: August 6-12, 1990. Cracow: Agricultural University Press; 19-22.

2 main types of feeding in Hemiptera: lacerate-and-flush & salivary sheath feeding; 6 types of filter chambers; Malpighian tubules in Sternorrhyncha may be functional substitutes of actual insect Malpighian organs; relationships within Hemiptera discussed on basis of above features; Homoptera considered to be artificial group.

