THE NEWSLETTER OF THE ORTHOPTERISTS' SOCIETY

Metaleptea

VOl. 20, NO. 1 SEPTEMBER 2000

INSIDE THIS ISSUE

Come to Montpellier

19-22 August 2001

Eighth International Meeting of the Orthopterists Society

The exciting website for this meeting is now open, thanks to CIRAD computer officer Pierre-Emmanuel Gay (with help from Piotr Naskrecki, OS Electronic Information Officer), so click on http://os2001.cirad.fr/ and browse through the information on the Meeting, Montpellier, and Carcassonne.
For more information, see page 3.

METALEPTEA HAS A NEW EDITOR

Dr. Marianne Niedzlek

It is my pleasure (and relief) to announce that Dr. Marianne Niedzlek of North Carolina State University, has graciously accepted the position of Editor of Metaleptea starting with the fall issue. (Please note that she is not responsible for this issue.) With her enthusiasm and efficiency, and her background in behavioral ecology and evolution, she should be able to attract articles from a wide variety of orthopterists and to make this newsletter an exciting one. So please provide her with copy, comments, and suggestions. If you do not do so, she may have to lean on members for such contributions (and she will surely be more persistent than I have been). Her address is:

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I would like to take this opportunity to express the appreciation of the Orthopterists' Society to the **Department of Zoology of North Carolina State University** for their financial and moral support for Dr. Niedzlek in this endeavor. -T. J. Cohn, President

Appreciation for Contributors

So many members have contributed to the Research Fund, the Sponsored Membership Fund, and to the General Operating Fund this year, that I have been unable to thank each of you individually. Please accept my gratitude, even in this impersonal way. Your contributions are most important in keeping our dues and subscription fees to the minimum which allow all orthopterists to participate in the Society, regardless of their financial situation, and in enabling us to increase the number of Research Grants awarded. In addition, your contributions have allowed us to publish the Katydids of Costa Rica, to shortly publish the final volume of the Orthoptera Species File, and to plan for the next number in the series, "Publications in Orthopteran Diversity."

As you can see from the accompanying Financial Report, this kind of income has made it unnecessary to dip into our investment funds (other than planned small withdrawals each time the funds increase 10% over the total value at the time of the previous withdrawal) which can thus continue to participate in any further increase in the U. S. stock market. Of course, our Endowment funds are restricted so that only the interest income from them can be spent.

Another form of contribution is important to the Society: Sustaining Members make, in essence. regular small yearly contributions. These enable us to budget efficiently and helps us to plan for more activities, and I would like to encourage more of you to become Sustaining Members. I would particularly like to thank this year's new Sustaining Members, STANLEY K. GANGWERE (founder of the Society and for many years our omniscient Executive Director), LUDIVINA BARRIENTOS-LOZANO, and VERNON R. VICKERY (former President of the Society).

New Position Established: Electronic Information Officer

Because of the increasing importance of electronic communication, and its probable dominance in the near future, I have established, with Board concurrence a new Orthopterists' Society position of Electronic Information Officer. Because the major goal of the Society is to share information,we consider this position so vital to our operation that I have appointed, in an interim capacity, Dr. Piotr Naskrecki, pending approval of a constitutional amendment to be presented at the Montpellier Conference. Under this amendment, the EIO will serve as a regular member of the Governing Board, and will develop electronic programs that the Board approves.

Dr. Naskrecki is particularly expert and is innovative in these matters, and I am happy to report that he has accepted the position. He has been largely responsible for our already excellent and constantly expanding Website.-T. J. Cohn, President

Payments Needed for JOR Colored Plates, Half-tones, And Page Charges

Please do not forget to pay for your colored plates and half-tones- I have received payment from only two authors for colored plates and half-tones. Because of the expense, these costs are charged directly to authors.

Although there are no page charges for publishing in JOR, we ask that authors with institutional or grant support bear the cost of their paper at US $20 per page, and contributions from others will be appreciated. Only if about half the authors pay page charges can we keep the cost of the subscription to JOR at the current price so that all may subscribe whatever their financial situation. Your payments serve as a revolving fund to partly pay for the next issue of JOR. So far I have received page payments for only five of the 28 papers published in this number. –T. J. Cohn, Acting Treasurer.

Corrected Price of JOR 8 Colored Plates

In my rush to get the last issue of JOR printed without more delay than we had already encountered I authorized the printer to use his regular source for colored plates without inquiring as to their cost. Consequently, it looks like I ordered the Rolls Royce, or coffee table quality, and we were charged accordingly. As I was the one at fault, I will share the cost with all authors whose papers contained colored plates. If you will pay half or one-third of what you were billed, I will make up the difference. -T. J. Cohn

INTERNATIONAL CONFERENCE ON ORTHOPTEROID INSECTS

8th Triennial Meeting of the Orthopterists' Society
Montpellier, France, 19-23 August 2001

LETTER FROM THE PRESIDENT

Fellow members of the Orthopterists' Society,

The Society returns to Europe for its Eighth International Meeting after two conferences in the tropical climes of Hawaii and northern Australia. For this conference we have been invited by Dr. Michel Lecoq to meet in Montpellier in southern France under the auspices of CIRAD-AMIS-PRIFAS, the pre-eminent acridid research organization of which Dr. Lecoq is the Director. This lovely old university city has modern conference facilities and excellent housing. What a place and time to demonstrate the vitality of our society- and vital we are, with a fine research journal which has just been accepted for indexing by Biological Abstracts, increasing monographic publication, more research grants, larger membership, and a very useful and expanding Website.

Because Montpellier is near the center of Europe, we issue a special invitation to students from this continent as well as those from others. As a member of my doctoral committee said, "It is my job to learn from my students." We have purposely kept student registration fees to the minimum, inexpensive housing is available, and we are planning a special student symposium.

In order to stimulate discussion, the format of the meeting is being changed somewhat from what is normal at such meetings. We are planning several symposia each to be followed by a roundtable of selected specialists prepared to analyze, confirm, refute, and argue the topics explored by the speakers, with audience participation. Because this will reduce the amount of time for oral presentations, we are asking participants to develop instead posters wherever possible. Posters have an advantage in that the material can be studied more carefully (rather than presented as slides flashed quickly on a screen, usually in unreadable type), and discussed at length with the author. Coffee breaks and lunches will be held in the same room as the posters so that the posters may be examined at leisure.

So bring your most interesting situations and your new and controversial concepts- you are sure to find a receptive audience in Montpellier. And bring as well your ideas for improving the Society and its publications: how we may better serve our members, how we may better advertise our services to other biologists, and how we may increase the visibility of the Journal of Orthoptera Research and of our monograph series.

To further your pleasure, plans are being made for a day trip to the old walled city of Carcassonne, and for a weeklong field trip following the conference into the depths of the Massif Central, especially timed for the height of the Orthoptera season.

Exciting topics enhanced by French food and drink and a leisurely pace should make this Eighth International meeting a memorable one.

Theodore J. Cohn, President

Since the previous letter was written, we have developed a schedule for the meeting, and topics for three of the four symposia, as detailed on the next page. This schedule and much other information can be found on the Conference Website, http://os2001.cirad.fr/ where updates will be posted, especially deadlines for submission of abstracts and papers for publication in JOR.

MONTPELLIER CONFERENCE SCHEDULE

SUNDAY, 19 AUGUST.
PM Registration.
MONDAY, 20 AUGUST.
AM Opening Ceremonies and Plenary Lecture
PM Pest Management Symposium, "**Are locusts and grasshoppers worth controlling?**" Michel Lecoq (France).
TUESDAY, 21 AUGUST.
AM Systematics Symposium, "**Molecules and morphology: towards a synthesis of phylogenetic methods.**" Theodore J. Cohn (USA).
PM Ecology Symposium, "**Comparative ecology and faunistics of grasshoppers in the grasslands of the world.**" Maria-Marta Cigliano (Argentina).
WEDNESDAY, 22 AUGUST.
AM Student Symposium (being organized).
PM Oral presentations and demonstrations.
Evening Gala dinner.
THURSDAY, 23 AUGUST.
Guided tour of the walled medieval city of Carcassonne.
FRIDAY, 24- WEDNESDAY, 29 AUGUST.
Field trip to the Massif Central (being organized).

There will be only one afternoon for oral presentations. Because of this, we urge participants to submit posters. Several participants at other meetings tell me that posters are very effective and have formed an important part of the meetings they attended. In our meeting, the posters will be displayed in a room adjacent to the lecture hall, and a half-hour each day after lunch has been set aside for examination of the posters.

BRUNNER VON WATTENWYL AND HIS IVORY RULER

Carlos Carbonell

I have spent a considerable part of my research time looking for the types of neotropical acridoid species and photographing them. Also, of course, studying these specimens, often dissecting their phallic complexes and drawing them, and writing such notes as I thought at the moment would allow me to recognize these species afterwards. For this task I used to carry with me a rather bulky set of plastic trays with specimens, some of them my own, many borrowed from different museums, with the purpose of having specimens compared with the types and, hopefully, belonging to the same species. With these purposes I visited practically all the museums which were known to harbor such types in the US and Europe. In many European museums I found that I was the first person who had examined these types after their original descriptions were made. Exceptions were the pyrgomorphids, which in every case had been already studied by Kevan. Some other types had been also been examined by Hubbell. In many cases, I found series of cotypes among which I had to mark a lectotype. And in some cases too, I found a specimen, which was probably, the type but was not marked as such. Or even a small series, without any markings, which was probably the type-series. In these cases, I had to go to the original publications and study the specimens with the help of the descriptions to see whether they were really the types, or the type series. And in this last instance, to decide on which one of them was the original description based. It was hard work, but I found it absorbingly interesting.

I visited Vienna several times. Dr. Max Beier was still there in my first visits. I remember that in 1966 I looked for and found there the types of some species described by Carl Stål in 1878 (Observations Orthopterologiques, 3). They did not have Stål's labels. It seems that at some time, a careful curator had found Stål's labels unsatisfactory, and had replaced them by new ones in a beautiful if very small handwriting. In some of these labels, it was mentioned that the specimen had been identified by Stål. In some, it was mentioned that it was a Stål type. And some had none of these data. And none had the usual type-label of the Vienna Museum. With the help of Stål's paper, it was easy to identify and mark them. Carl Stål was one of the best taxonomists of his time, and usually his descriptions left no room for doubt. When I had marked every one of them I took them to Dr. Beier and told him that I had found and marked all of Stål's types in the museum collection. Dr. Beier looked at me with a puzzled expression in his face. "Stål's types?" —he said— "As

far as I know Stål acridoid types are in Stockholm". Then I showed him Stål's paper where, at the end of his description of everyone of these species it was written "Coll. Brunner". Dr. Beier apparently was not entirely convinced that I was right and asked me to leave Stål's paper and the specimens with him for a while. But soon afterwards, he came to the place where I was working to tell me that I was right, that these were Stål's types, and thanked me for having studied and marked them. It seems that, after Brunner von Wattenwyl's death, nobody in the Vienna Museum had studied these specimens, and their status of types was not apparent. As for my finding these types there, I must tell that when I reached Vienna I was coming straight from Stockholm where I had thought all the Stål types were. But I hadn't found some of them. Besides, my seeing under the description of these species the indication "Coll. Brunner" had told me that they should be in Vienna.

Well, the mention of Brunner von Wattenwyl reminds me of the title of this note, with which none of the above has much to do. But of course, my main and most difficult task in Vienna was to locate and study Brunner von Wattenwyl's types of neotropical acridoids. I had to do it with the usual difficulties as mentioned above.

But here I found an additional one. In most cases, when after a considerable amount of work, I had decided that one of the specimens was the holotype, I found that its measurements did not coincide with the ones given by Brunner. Upon coming across this situation a number of times, I decided to state the case to Dr. Beier. Brunner von Wattenwyl had described many species, not only of acridoids, not only of neotropical species, but of many different insects from practically all over the world. So, many of his types had been studied previously by many different specialists. "You shouldn't worry about these differences in the measurements" —said Dr. Beier— "What happens now to you has happened in general to everybody studying Brunner's types". "But, what is supposed to be the cause of that?" —I asked—. Dr. Beier hesitated briefly, but then said: "Well, the reason is not known for certain. But oral tradition in the Museum says that Brunner von Wattenwyl had a beautiful ivory ruler he used for measuring the insects. But this ruler had been broken for some time, and its front end was missing. It seems that Brunner hated the idea of throwing away his precious ivory ruler and getting a new one for his work. So he went on using it, but since several millimeters at its front end were missing, he would imagine where the zero should be, place the ruler accordingly, and then registered the measurements made in this way. And that may explain why so many of them are not accurate". And this is all I know of Brunner von Wattenwyl's ivory ruler. But I think it is worth registering it as an informal, probably true episode of the history of Acridology.

AN AUSTRALIAN EXPERIENCE

Dra. Ludivina Barrientos Lozano

From September 1999 to February 2000, I had the opportunity to participate in a series of field trials investigating the use of the fungus *Metarhizium anisopliae var. acridum* as a biological insecticide to control outbreaks of the Australian Plague Locust (*Chortoicetes terminifera*) and the Wingless Grasshopper (*Phaulacridium vittatum*), conducted by the Australian Plague Locust Commission (APLC) and the Commonwealth Scientific and Industrial Research Organization (CSIRO). I served as a post-doctoral invited Scientist.

The potential use of *Metarhizium* as a biological insecticide to control locusts and grasshoppers offers a wide range of advantages: it is highly specific, killing mainly locust and grasshopper species, it has low persistence (10 days average), and in general, it is environmentally safer than chemical products. Nevertheless, extensive massive applications of the product world-wide, may require further work on the effect of the fungus on non-target Orthoptera and other organisms, on the environment (soil and water deposits), and on the long term effect of the pathogen on orthopteran target species. Introduction of exotic strains of *Metarhizium* into other countries requires additional special considerations. In most developing countries the introduction of microorganisms such as fungi, bacteria, etc. is not regulated yet, and introduced strains may displace native strains which in theory could be more effective because they are better adapted to local conditions. Therefore, it might be more appropriate to improve massive quality production and use local strains of *Metarhizium*. An additional important aspect to consider is the cost per hectare which may still be high compared to chemical products.

But what is the nature of *Metarhizium* and how does it affect locusts and grasshoppers? The genus *Metarhizium* includes several species *(M.anisopliae, M. flavoviride and M. album*) commonly known as "green muscardine fungi" which occur normally in the field and play an important role in regulating locust, grasshopper, and scarabaeid beetle

populations, amongst other pests. *M. anisopliae* is presently used commercially in several countries, such as U.S.A, Brazil, Australia. The infectious units of these fungi are asexual, haploid conidiospores; these spore/conidiospores may penetrate and infect insects in two ways: (1) by ingestion when the insect feeds on sprayed vegetation, or (2) through direct contact with the cuticle of the insect where the conidia germinate and produce germ tubes which penetrate the body cavity. Once inside the insect, the fungus proliferates as hyphae, killing the host in few days. The incubation period of the fungus is about 6-7 days, sick insects reduce feeding behavior 3-4 days after being infected, become sluggish and start dying by the 6th-7th day.

Experiments were carried out in October and November in the agricultural surroundings of Ardlethan, an area known as the Riverina of the State of New South Wales, where an Australian Plague Locust infestation was very severe. Results were excellent; an oil formulation of 3X1012 conidia/ha- aerially sprayed- provided 90% nymphal mortality within 3 weeks after the application. The Australian Plague Locust has proved to be a very sensitive species to *Metarhizium*. This biological insecticide, under the commercial name of "Green Guard," is now being used operationally against this locust species by the APLC and CSIRO in Australia. However, research activities continue to reduce the dose used- with a subsequent reduction in cost/ha for future extensive and massive application of the insecticide- to obtain registration of Green Guard and to demonstrate the effectiveness of *Metarhizium* against other locust and grasshopper species.

In addition, as part of a program to develop *Metarhizium* as a biopesticide for use against locusts and grasshoppers in Australia and Mexico, laboratory bioassays were undertaken to compare the pathogenicity of two Mexican isolates of *Metarhizium* (MPL-40 and MPL-32) and the Australian Isolate FI-985 of *Metarhizium anisopliae* var. *acridum*. All 3 isolates were derived from acridid locusts and have similar DNA fingerprints. However, the Mexican isolates have smaller, more ovoid conidia than the Australian isolate; MPL-40 grows faster at temperatures below 20˚C and slower at temperatures above 30˚C than the other two isolates which have similar temperature responses. A paper on "Effect of dose and temperature on the pathogenecity of three isolates of *Metarhizium* for the Wingless Grasshopper" will be published soon.

Temperature has a dramatic effect on the performance of the fungus. Under mildly fluctuating field conditions of 10-30°C, peak nymphal mortality was reached three weeks after spraying. However, under maximum field temperatures of 35-40°C, peak mortality was reached two weeks after spraying. Nymphs collected in the field after spraying and maintained under laboratory controlled temperatures of 25-30°C, reached peak mortality two weeks later.

It is amazing how well locust and grasshoppers do under the Australian sky, with at least two other species being major pests (the Spur-throated Locust, *Austracris guttulosa*, and the Migratory Locust, *Locusta migratoria*).

I was very impressed with the results achieved with "Green Guard" to control the Australian Plague Locust and the Wingless Grasshopper, as well as with the research and work facilities and the organization of the research team.

I am very grateful to David Hunter, APLC Senior Officer, Graeme Hamilton, APLC Director, and Richard Milner, CSIRO researcher, for facilitating all the arrangements and making possible this positive and rewarding experience. I would like to take this opportunity to thank all the staff from the APLC and the Insect Pathology Unit from CSIRO for their help and support during the period I visited both Institutions. My very special thanks are given to the Mexican Council of Higher Technological Education (COSNET) for providing me with the funds to work in Australia.

LOCUSTS, LIZARDS AND LYMPH NODES (Conclusion)

(Part One was published in Metaleptea Vol. 19, No. 2, Nov. 1999)

Gregory Sword, Section of Integrative Biology and Brackenridge Field Laboratory,
University of Texas, Austin, TX 78712

The elucidation of density-dependent aposematism in S. *emarginata* also suggested that the desert locust might be up to the same trick. Investigators had long suspected that the gregarious phase of the desert locust could be aposematic, but it had been observed to be eaten by predators in the field and the lab on numerous occasions. These observations were always made in outbreak populations. They also failed to take locust host plant use and predator learning into consideration. I suspected that if the desert locust did derive gut-content mediated protection from predators and expressed density-dependent aposematism, the most likely place to look for it would be in pre-outbreak source populations in the plague recession area.

The rest of the story is a testament to incredible luck and the power of the comparative method. The same phenomenon that occurs in populations of S. *emarginata* in central Texas also occurs in populations of the desert locust in Africa. During the Fall and Winter of 1998, I conducted fieldwork in Mauritania in order to determine if the desert locust also exhibited density-dependent aposematism. Using a simple behavioral assay, it became clear that host plant use has a substantial effect on locust palatability to predators. Fringe-toed lizards, *Acanthodactylus dumerili*, learned to avoid desert locust juveniles fed *Hyoscyamus muticus* (Solanaceae), a commonly used host plant in the Mauritanian recession area. Equally amazing was that the expression of density-dependent aposematism resulted in nearly a five-fold decrease in predation on high-density gregarious phase (yellow-and-black) relative to low-density solitarious phase (green). Predation can be an important desert locust mortality agent in small populations. These results suggest that predation pressure may decrease as a result of density-dependent color change in populations feeding on toxicity-conferring plants. The reduction in predation would come just as these populations are beginning to increase, potentially contributing to outbreaks. Density-dependent aposematism has important implications for our understanding of desert locust population dynamics and contributes to the growing recognition of the importance of small-scale local processes in facilitating locust gregarization and swarm formation.

So what about the lymph nodes? A few days after my personal palatability assay in which I chewed up an entire grasshopper, almost every lymph node in my body started to swell up. My neck, underarms, groin, you name it. Needless to say, I went to the doctor. Prior instances of entomophagy (you know, while teaching field courses, livening up parties, or just eating processed foods) had never done me any harm, so I made no mention of it to my doctor. Upon seeing me, he immediately put on his mask and rubber gloves and took a few steps back. I was assigned a battery of blood tests and X-rays, all of which came back negative. That sounded like good news, but things got worse. The final two ailments he suspected, lymphoma and leukemia, required a biopsy for diagnosis. Within days I was on the operating table having a golf ball-sized lymph node excised from my neck. Fortunately for me, I was cleared on all counts. My baffled doctor suggested that I either consult a shaman or just wait it out and see what happens.

I deflated a few days after the biopsy and everything went back to normal. I resumed my fieldwork and soon found some S. *emarginata* nymphs that normally ate Skunkbush feeding on a different plant. My curiosity about their palatability got the best of me and I chewed one of them up. A few days later I was swollen up again. Out of embarrassment, I never returned to my doctor to tell him that grasshopper chewing was the source of my malady. I still don't know if it was the grasshoppers, a symbiont, or what that caused my immune system to go ballistic. I have no plans to repeat the experiment, so I may never know. Wisely, I declined to sample any locusts in Mauritania. The toxicity-conferring plant they were feeding on, Hyoscyamus muticus, contains a number of neurotoxic alkaloids that can induce hallucinations and potentially death. Since camels and goats won't even eat it, I decided to hold out.

Recently, I've been investigating the intraspecific effects of desert locust nymphal coloration on locust behavioral interactions. Soon, I'll be looking at the expression of gregariousness in non-swarming North American *Schistocerca* species. I've received help from so many people along the way that proper name-dropping would require a few more pages. Thank you very much to everyone who's been kind enough to offer assistance and advice. I hope to meet and work with many more of my fellow orthopterists as the future unfolds. Very special thanks to the Orthopterists' Society Research Fund for helping me get this project started.

Selected readings (for Sword, G., Locusts, Lizards, and Lymph Nodes)

Dopman, E.B. & Sword, G.A. Host plant-associated genetic differentiation in a polyphagous grasshopper, *Schistocerca emarginata* (=*lineata*) (Orthoptera: Acrididae). Unpublished manuscript.

Pener, M.P. & Yerushalmi, Y. 1998. The physiology of locust phase polymorphism: An update. Journal of Insect Physiology, 44:365-377.

Reeson A F. Wilson K. Gunn A. Hails R S. Goulson D. 1988. Baculovirus resistance in the noctuid Spodoptera exempta is phenotypically plastic and responds to population density. Proceedings of the Royal Society of London - Series B: Biological Sciences, 265:1787-1791.

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Sword, G.A. & Dopman, E.B. Developmental specialization and geographic structure of host plant use in a polyphagous grasshopper, *Schistocerca emarginata* (=*lineata*) (Orthoptera: Acrididae). Oecologia, In Press.

Sword, G.A., Simpson, S.J., El Hadi, O.T.M. & Wilps, H. Density-dependent aposematism in the desert locust. Submitted to Proceedings of the Royal Society of London - Series B: Biological Sciences

Wilson, K. How the locust got its stripes: The evolution of density-dependent aposematism, Trends in Ecology and Evolution, In press.

Current Controversies

IS TAXONOMY REALLY SCIENTIFIC?

Theodore J. Cohn

If the diagnostic characteristic of " science" is the construction of hypotheses and theories that are based on, and testable by observations, then some of the traditional methods of taxonomy bring its scientific nature into question.

The delimitation of new species, the determination of relationships, and the construction of phylogenies are all hypotheses that should be objectively testable especially by others, if the hypotheses are to be considered scientific. The observational evidence for taxonomy is characters that are compared among taxa, whether they be morphological, ecological, behavioral, or molecular. Thus, the crucial feature of taxonomy must be in the comparison of those characters. For example, it should be expected that members of a species share more than a single distinctive character, that members of higher taxa also share several distinctive characters, or conditions derivable from those characters. Surely the vast majority of taxonomists state these facts explicitly in their diagnoses and their discussions of relationships.

But do taxonomists otherwise present their characters in a way that would facilitate testing by other interested taxonomists of those hypotheses using the same characters? The traditional method of taxonomy is the paragraphic diagnosis and description, but this method makes it extremely time consuming for anyone else to check the distribution of characters used by a taxonomist in erecting hypotheses. For example, merely to determine if a diagnostic character of a species character is indeed unique, one must wade through many pages of descriptions of all species of the genus. This becomes virtually impossible in a large taxon such as *Melanoplus* which has hundreds of species, even if all the species were adequately described (and the majority are not). The same problem is encountered when one wishes to test hypotheses of relationship using other characters in the descriptions, or to identify convergence in various characters. The same

applies to measurements when they are included in species descriptions; and when they are tabulated for the species in a genus, they are often presented in a way that makes comparison very difficult (for example, mixing measurements for males and females in succeeding rows, and having a row for the same measurement character rather than a column).

The paragraphic description has practical problems as well. Unless one is dealing with a template description, some characters may be inadvertently left out, and others may not be comparative. In the extraordinarily complete descriptions of *Ceuthophilus* by Hubbell in his monumental 1936 monograph, there are a number of infuriating cases like this, which often interferes with even simple identifications.

Some of these problems would seem to be solved with illustrations. But although it is commonly thought that a picture is worth a thousand words, in taxonomy, figures as usually presented pose three problems. First, if the same structures for different species are presented on different pages, they are very hard to compare. Second, the non-specialist eye may be caught by trivial differences (see next) that in fact may not be important when compared in a series. And third, if only one specimen is illustrated, almost surely there will be variation in the series making differences seen in the figures difficult to evaluate. Some of these problems appear in my own papers; although we tabulated the drawings, there are no indications of critical features, and in one case in the *Barytettix* paper, we presented structures just to show the reader what they looked like in general but failed to indicate that the differences were the preservational artifacts!

Thus, the usual method of presentation of taxonomic descriptions makes it difficult to compare characters, the very lifeblood of the scientific method in taxonomy. One almost gets the impression that this kind of description is designed to PREVENT checking on the conclusions of the describer, and enhancing the authority of that taxonomist. It lends credence to the inaccurate idea that the specialist has great intuition and knows what the "good characters" are. Of course, this is to a large extent true of specialists, but only because they have compared characters in their minds from the experience they have had with examining numerous specimens of many species. But if that which is in the mind is not explained and justified in print, then one is not dealing with science.

Paragraphic presentation has a serious deleterious effect on modern analysis. There are now computer programs that can handle large numbers of characters and enable one to thoroughly and easily investigate classifications, to test hypotheses of relationships, and to study various biological problems such as character evolution (including convergence). But with paragraphic descriptions and unannotated figures, others who wish to employ such electronic methods are themselves forced to laboriously tabulate all the published characters, a task that could have been readily done by the original describer. In making such a tabulation the non-specialist runs the risk of misinterpretation of differences in wording and slight differences in description and illustrations from species to species. And even the describer may not quite remember how a particular structure in species number 29 was described in species number 11 a few weeks previously.

Tabulation of characters at the time of description would solve all these problems and bring taxonomy into compliance with the scientific method. How little additional effort (if any) would be required of the original describer or reviser. The only drawback is that a table does not provide infinite space for detailed description of difficult characters. Yet this too can be easily solved with footnotes or tiny pictures in the body of the table. And illustrations would indeed be worth many words, if the reader were guided by brief instructions concerning what to look for, or by the use of arrows, similar to the technique in the famous Peterson field guides.

THE ORTHOPTERISTS' SOCIETY 1999 FINANCIAL STATEMENT

(in U. S. Dollars)

Income

Dues	3,979
Subscriptions	3,434
Page charges	2,060
Investment Income[1]	
Checking account interest	32
Sale of Strong Growth Fund shares	2,500
Undesignated contributions	827
Sponsored memberships and subscriptions	575
Contributions for research grants[2]	15,446[2]
Realized capital gains (on redemptions from Corp. Bond Fund, Growth Fund, and Growth & Income Fund)	1,170
Visa/Mastercard fees	132
[Unrealized capital gains from switching funds and from capital gains distributions ($12,900), all reinvested, as reported to the Internal Revenue Service, are not here considered to be income but are reflected in fund balances]	
TOTAL INCOME	30,125

Expenses

Printing Metaleptea (mailing costs absorbed by institution)	595
Assistance in composing Metaleptea	60
Printing Journal of Orthoptera Research No. 7 (mailing costs absorbed by institution)	6,224
Editor compensation	3,318
Editorial assistance	765
Assistance in mailing reprints	270
Postage for mailing reprints	113
Reprinting JOR No. 5[3]	4,274
Executive Director compensation	1,584
Secretarial assistance and supplies for Executive Director	533
Research grants[4]	5,200[4]
Travel reimbursement (trip by N. Jago to arrange for 2001 Int. Meeting)[3]	827
Visa/Mastercard charges[5]	352
Bank fees (wire transfer for grant, stop payment order)	55
TOTAL EXPENSES	24,170
Excess of Income over Expenses	5,955

Footnotes

[1] Bond interest ($1,096) and withdrawal from Str. Gr. and Inc. Fund ($2,000) were debited in Dec. 1999 but not deposited until early 2000.

[2] Large contributions to cover grants paid in 1998 and 1999, and for grants awarded in 1999 but paid in 2000.

[3] One-time expenses.

[4] For grants awarded in 1998 but paid in 1999. All grants awarded in 1999 ($7,600) were paid in 2000.

[5] Visa charges were renegotiated and will be reduced in 2000.

[American Express and Diners Club capability will be coming soon. I am negotiating with our bank to accept these two cards. The bank will chargwe us a small extra fee for them, but the $2 service charge that WE charge members will cover this cost.]

Account Balances

	Beg. Bal.	End. Bal.
Research Fund		
Oakmark Fund (to Strong Blue Chip Fund)	17,410	-0-
Strong Blue Chip Fund (from Oakmark Fund) (including increase in share price)	-0-	22,348
Endowment Account (Morgan Stanley, Dean Witter)		
FNMA Bond	10,088	9,363
M. S. D. W. S&P 500 Index Fund (dividends and capital gains distributions reinvested)	6,257	7,447
M. S. D. W. Liquid Assets Fund (Bond interest deposited in Liq. Assets Fund and withdrawn periodically)	358	1
Operating Account		
Strong Growth Fund (to Strong Growth & Income Fund)	33,303	-0-
Withdrawal from Str. Gr. Fund (to Str. Corp. Bond Fund)		-2,500
Strong Growth & Income Fund (from Strong Growth Fund)		
Withdrawal from Str. Gr. & Inc. Fund (to checking*)		-2,000*
(Including reinvestm. of capital gains distributions and higher share price)	-0-	39,221*
Strong Corporate Bond Fund	13,495	
Deposits		+2,500
Withdrawals (direct payment of bills, or to checking)		-13,476
(Including reinv. of div. and cap gains, and lower share price)		2,822
Morgan Stanley Dean Witter Account		
FHLB Bond	5,000	4,638
M. S. D. W. Liquid Assets Fund (Bond interest deposited in Liquid Assets Fund and withdrawn periodically)	189	1*
Checking Account	2,040	16,641**
TOTAL FUND BALANCES	**88,140**	**102,482***

*Withdrawals of $2,000 from Gr. & Inc. Fund, and $1,096 M. S. D. W. Liq. Assets Fund (bond interest) were debited by these Funds in Dec. 1999, but not deposited in checking account until 2000, therefore ending fund balances should be increased by these amounts for full valuation of Society assets.

** Accumulation of funds to pay large expenses (JOR, research grants) in early 2000.

Financial Policy

1) Withdrawals from Strong Growth Fund and Strong Growth and Income Fund follow the policy established in 1997 that half of every 10% increase over the value of the last withdrawal, be withdrawn to take advantage of stockmarket upward moves and to protect against market downward moves. It still allows us to participate in further market upswings with a 5% increase in the value of the fund. Such withdrawals have been used for expenses, but might be invested in bonds for an increase in income, or reinvested in growth funds at a lower price
2) Interest from bonds in the Endowment Fund and in the Operating Account is deposited in money market funds (Liquid Assets Fund) for ready availability for Society expenses. These money market funds operate to maintain the capital value; they currently yield between 6 and 7%.
3) At the present time, the Society has two restricted accounts, one for the expenses of the development of an electronic version Orthoptera Species File being done by David Eades ($5,000), and the other contains the proceeds of the sale of copies of "The Katydids of Costa Rica" (now about $1,000), which will be used as a revolving fund for the publication of other volumes in the series, "Publications on Orthopteran Diversity." Both accounts are currently invested in the Liquid Assets Fund and are not indicated separately in the above Fund Balances.

BOOK REVIEWS

Die Struktur der Eihüllen von 48 Phasmatodea-Arten aus der Sammlung des Löbbecke Museum und Aquazoo Düsseldorf. The structure of the egg chorion of48 Phasmatodea species from the collection of the Löbbecke Museum and Aquazoo Düsseldorf. **Klaus Lipinski, Hartmut Greven, Dieter Schulten and Siegfried Löser**, 1999. Entomologische Mitteilungen aus dem Löbbecke Museum and Aquazoo, D-40200 Düsseldorf, Germany. Paperback, A5, 125 pages, 3 tables, 49 black and white plates. Price 40DM.

This is a companion volume to Schulten's book on breeding phasmids "Wandelnde Blätter, Stab- und Gespenstschrecken" (1995), in the same yellowcover design showing a female Extatosoma tiaratum, with the addition of two eggs. However, as this book only covers scanning electron microscope studies (some for the first time), it will have a much more limited appeal.

There has been a noticeably increased interest in the study of phasmid eggs recently, including the release of a CD-ROM by two enthusiasts from Germany which covers 180 species. The work reviewed features the eggs of 48 species, with text in German (and an English summary). After giving classification tables [including errors in spelling for families and species, such as *P. serratipes* (species name, but not the correct genus, p. 80), referred to as *P. acanthopu*s (p. 6)], each species is covered by a page of text alongside a one page plate, with between 5-10 reasonable quality photographs of key parts of eggs. Unfortunately, the country of origin of culture or other stock, is not mentioned, except for some undescribed species included.

The short bibliography includes some of the key references on phasmid eggs. However, it omits Clark Sellick's important 1998 paper 'The micropylar plate of the eggs of Phasmida, with a survey of the range of plate form within the order,' Systematic Entomology 23: 203-228, amongst others. Whilst this book is useful for phasmid enthusiasts seriously interested in studying eggs, there is little excuse for numerous errors in the names of species. These could easily have been avoided by taking note of errors pointed out in reviews of Schulten's book [mainly repeated here], or by taking the trouble to send the manuscript for checking by one of a number of phasmid specialists. Nevertheless, this is the first publication of its type on phasmid eggs and one of 17 in-print books on phasmids (15 published in the1990s). It highlights taxonomic problems in some well-known genera (which will hopefully be worked on by taxonomists in the near future). The errors in the main species covered are listed below, quoting page references:

14 Diapheromera femorata (Say, 1824) - not 1828.
16 Oreophoetes peruana - not peruanas.
18 Bacteria rarospinosa (Brunner, 1907) - not Dyme.
22 Carausius alluaudi (Bolivar, 1895) - not Bolivar, 1895.
24 Carausius morosus (Sinéty, 1901) - not Brunner, 1907.
32 Lonchodes modestus (Brunner, 1907) - not Brunner, 1907.
34 Lonchodes strumosus (Brunner, 1907) - not Brunner, 1907.
36 Lonchodes brevipes Gray, 1835 - not L. uniformis Westwood, 1848.
40 Lopaphus muticus (Redtenbacher, 1908) [if it is this species] – not Candaules muticus Redtenbacher, 1908.
42 Paramenexenus laetus (Kirby, 1904) - not P. operculatus Redtenbacher, 1908.
44 Lopaphus perakensis (Redtenbacher, 1908) - not Paramyronides.
54 Gratidia sp. - not Ramulus.
56 Gratidia sp. - not Ramulus.
60 Hesperophasma lobata (Redtenbacher, 1908) - not Redtenbacher, 1908.
80 Phobaeticus serratipes (Gray, 1835) [or Baculolonga Hennemann & Conle, 1998 if one agrees with this genus] - not Pharnacia.
82 Acrophylla wuelfingi - not wülfingi.
84 Eurycnema versirubra (Serville, 1838) - not E. herculeana (Charpentier, 1845).
86 Rhaphiderus scabrosus (Percheron, 1844) - not 1829- 44.
88 Extatosoma tiaratum (Macleay, 1826) - not Mac Leay, 1826.
90 Bacillus rossius (Rossi, 1790) - not rossii (Fabricius, 1793).
91 Dares verrucosus Redtenbacher, 1906 - not D. breitensteini Westwood, 1859 [in any case, described by Redtenbacher, 1906]

Reviewed by **Paul D. Brock**

Die Heuschrecken Mitteleuropas (The Orthoptera of Middle Europe, in German). **Sigfrid Ingrisch & Günter Köhler, 1998.** Die Neue Brehm Bücherei Band 629, Verlag Westarp Wissenschaften; Magdeburg, 460 pages. ISBN 3-89432-461-9, DM 78,00.

With this book, Sigfrid Ingrisch and Günter Köhler, two of Germany's best orthopterists, provide a comprehensive source of the state-of-the-art knowledge about the general biology and ecology of middle European Orthoptera s.str.

The comprehensive nature of the book is reflected by the diverse chapters covering a vast number of relevant aspects: systematics and evolution, life cycles and phenology, population dynamics, diet, natural enemies, behavior, mobility, habitat selection, communities and habitat change, field registration and ecological assessment, and last but not least faunal changes, threat and protection.

The authors can count on own long-standing and important scientific studies, as well as an extensive literature review of over 1300 references. The separate chapters are written each by one of the authors according to their specialty, which guarantees a complete treatment of the specific subject. In addition to the high scientific standard of the text, the authors never lose contact with applied aspects, for instance grasshoppers as pest organisms, extinction and re-colonisation, negative environmental impacts on populations, or species protection issues. Also, the book serves as an ample source for field methods with regard to ecological studies of Orthoptera, beginning with mark-recapture techniques, through field recording of the species, to food analysis methods, and more.

The book is a must for any person interested in Orthoptera of Europe, be it a professional or an amateur. Moreover, because of its comprehensive nature, the book will have an impact reaching far beyond middle Europe (with the restriction that it is only available in German).

Reviewed by **Andreas Lang.**
[In this book you will NOT find determination keys, species monographs and area maps. Owning this book, you can avoid a time consuming literature search. I think you can order it without any problem via Amazon or so. **Martin Schaedler]**

***Check-List of European Orthoptera*. Heller, K.-G., Korsunovskaya, O., Ragge, D.R., Vedenina, V. Willemse, F., Zhantiev, R.D. & Frantsevich, L., 1998.** Articulata, Beiheft 7, 1-61. ISSN 0942-7066

A multi-national team of orthopterists from Great Britain, Russia, Ukraine, Germany and The Netherlands has published an up-dated check list of European Orthoptera, which appeared 1998 in *Articulata*, the journal of the German Orthopterist´s Society. This is the first pan-European synopsis of this sort since the works of K. Harz (1969, 1975, 1976). After the publications of Harz many new species were discovered and others reclassified; the authors present now a list of 974 recognized species (593 Ensifera, 381 Caelifera). Additionally, general information is given about the species´ distribution together with recent important references of systematic or faunistic papers. So, if you are up to hunting katydids and grasshoppers during your next holidays in Europe, this is the objective setting. The list of species is also available at ftp://131.188.170.4/public/heller/orthopt.xls Excel file (208 kbyte) or orthopt.doc Word file (520 kbyte).

Reviewed by **Andreas Lang.**

Die Heuschrecken Baden-Württembergs (The Orthoptera of Baden-Württemberg, in German). **Peter Detzel, 1998.** Verlag E. Ulmer, Stuttgart, 580 pages. ISBN 3-8001-3507-8, DM 98,00.

P. Detzel, with the assistance of numerous colleagues, has written the standard work of the Orthoptera s.str. of Baden-Württemberg, a federal state in southern Germany. It covers all known 70 species, and introduces each species in a separate section treating the species´ distribution in Europe and Baden-Württemberg, its biology and ecology, and its possible endangerment as well as potential protection measures. These specific species sections make this book valuable even for readers not particularly interested in the local orthopteran fauna of this federal state. The biological and ecological characteristics of each species are described on several pages with accuracy and love for detail, often together with the naming of relatively unknown or cryptic references and unpublished observations. Therefore, the material given in the book also provides valuable information with respect to Orthoptera occurring in other countries. The book is complemented by chapters of a more general nature, treating aspects such as nomenclature, morphology, feeding and reproduction biology, general orthopteran ecology, endangerment and protection, and the different habitat types with their special orthopteran communities, to name a few. The fantastic quality of the 222 colour photos must be emphasized, a fact which additionally justifies the price.

Reviewed by **Andreas Lang.**

BOOK NOTICES

Amazon Insects – A Photo Guide. **James L. Castner,** 2000. Feline Press, 160 pp, 200 photos, 5" X 5.75", ISBN 0-9625150-1-9, US$ 15.00.

Dr. Castner is a tropical biologist and professional photographer who has spent many years traveling throughout the rainforests of Central and South America. He has combined his talents as a photographer with his knowledge as an entomologist to produce a unique guidebook that deals with the insect and arthropod fauna of the Amazon Basin.

Amazon Insects is a useful resource to naturalists, research biologists, and tourists or other visitors to the tropics who would like to know more about the insect fauna surrounding them. Special effort has been made to include those species that are most likely to be seen while hiking on a tropical forest trail. Unlike most other works, the insects are identified to species whenever possible. All photographs are in color and feature some of the biggest, most beautiful, and most bizarre invertebrates that can be encountered.

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P.O. Box 357219
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Questions may be addressed to: jlcastner@biologicalphotography.com
jlcastner@aol.com

Erratum: The katydid pictured on Page 73 is *Phoxacris* sp.

The Praying Mantids. **Edited by Frederick R. Prete, Harrington Wells, Patrick H. Wells, and Lawrence E. Hurd,** 1999. Johns Hopkins University Press, 560 pp., 113 line drawings, 22 halftones, and 33 4-color illustrations, 0-8018-6174-8 (hardcover) US$ 89.95

The first book to present what is known about this fascinating group of insects and will be of interest to a general, educated audience (readers of Scientific American as example)

Praying mantids have fascinated people for thousands of years. In their Book of the Dead, ancient Egyptians honored the mantis as a minor deity, the "Bird-Fly," whose function was to conduct the souls of the dead to the netherworld. The Chinese bred mantids for fighting and celebrated their ferocity and foolhardy courage (they sometimes attack prey larger than themselves) in songs and poems. Today, mantids continue to seize the imaginations of serious researchers and backyard naturalists with their dramatic method of capturing prey, their bizarre "sexual cannibalism," and their appeal as "beneficial" insects.

The Praying Mantids represents the current state of knowledge on these remarkable insects, bringing together all that is currently understood about their ecology, taxonomy, reproduction, sensory systems, motor behavior, and defense strategies. The chapters reflect the strong personal stamp and intellectual commitment of the contributors, who have all done pioneering work in mantid research. Many of the selections present groundbreaking data on topics not previously explored. The text is enhanced by numerous illustrations, including a gallery of color images, and a final section of the book covers information available nowhere else on rearing

and breeding techniques. The foreword is written by Professor John Alcock, a leader in the field of animal behavior.

Generously illustrated and admirably comprehensive, The Praying Mantids is an invaluable resource for researchers, students, and teachers in the life sciences, as well as a fascinating book for hobbyists and anyone interested in animal behavior and natural history.

Chapters:
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Ecology of Praying Mantids
The Ecology and Foraging Strategy of Tenodera angustipennis
Mating Behavior
Hearing
Binocular Vision and Distance Estimation
Prey Recognition
Flight and Wing Kinematics
Prey Capture
The Hierarchical Organization of Mantid Behavior
Ontogeny of Defensive Behaviors
Ethology of Defense against Predators
Rearing Techniques, Developmental Time, and Life Span Data for Lab-Reared Sphodromantis lineola
Comparative Aspects of Rearing and Breeding Mantids
Mantids in Ecological Research
Histological Techniques for Mantid Research

Frederick R. Prete is an assistant professor in the Department of Biological Sciences at DePaul University.
Harrington Wells is an associate professor in the Department of Biology at University of Tulsa.
Patrick H. Wells is a professor of biology, emeritus, in the Department of Biology at Occidental College.
Lawrence E. Hurd is a professor and the chair in the Department of Biology at Washington and Lee University.

To order by phone from U.S. & Canada call 1-800-537-5487. Mon.-Fri., 8:30-5:00 EST

NEW MEMBERS

The Orthopterists' Society warmly welcomes our new members. We hope this association proves to be mutually beneficial and stimulating.

BECK, MR. JOHN R.
834 State St., Chester, IL 62233, USA

BRANSON, DR. DAVID H.
USDA-ARS, 1500 Central Ave.
Sidney, MT 59270 USA
Grasshopper ecology and management

BRASWELL, MR. W. EVAN
Department of Biology, MSC 3AF
New Mexico State University
Las Cruces, NM 88003-8001 USA
Speciation in Allonemobius

BRAUN, HR. HOLGER
Institut für Zoologie II
University of Erlangen
Studtstrasse 5, 91058 Erlangen, Germany
Behavioral ecologys/sociobiology/ecology, Neotropical katydids, especially Ecuadorian montane rainforest katydids

DE LA CRUZ ABARCA, DR. H. ALICIA
Jr. Cayetano Heredia 438 Jesus María
Lima 11, Perú
South American Tettigoniidae, systematics & ecology

FABER, DR. BETTY L
Liberty Science Center, Liberty State Park
Jersey City, NY 07305, USA
Cockroach Biology

FITZPATRICK, MR. MARK
Department of Biological Sciences
Louisiana State University
Baton Rouge LA, 70803. USA
Sexual selection on the courtship song of Gryllus texensis, G. rubens, G. bimaculatus, and G. pennsylvanicus; behavioural genetics and speciation (reinforcement) in crickets (G. texensis / G. rubens) and fruit flies (Drosophila persimilis / D.pseudobscura)

HARTMANN, PROF. DR. RÜDIGER H.
Dept. Biologie I, University of Freiburg
Hauptstrasse 1
79104 Freiburg, Germany
Endocrine control of reproduction and behavior in acridine grasshoppers

HUGEL, M. SILVAIN
Laboratoire de Neurophysiologie Cellulaire et Intégrative,
Université Luis Pasteur
UMR 7519 CNRS
21 rue Renée Descartes
67084 Strasbourg, France
Orthopteriods in the Rhine Valley and on the Ile de La Reunion, Phasmids

JANG, DR. YIKWEON
Center for the Integrative Study of Animal Behavior
Indiana University
Bloomington, IN 47405 USA
Speciation in North American field cricket species (Gryllus); sexual selection

JOSHI, DR. P. C.
Department of Zoology and Environmental Sciences
Gurukul Kangri University
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Community ecology, neem, environmental impacts, conservation

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Sexual selection, mate choice, molecular ecology

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Speciation, phylogenetics, populatin genetics

KOOYMAN, DR. CHRISTIAAN
CAB International Africa Regional Centre
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Nairobi, Kenya
Taxonomy, biogeography, biological control

MARQUIER, MME. IOANA C.
31, Cours "Jean Jaures"
38000 Grenoble, France
Phylogeny, molecular taxonomy, zoogeography, podismine grasshoppers

NUNNALLEE, MR. DAVID A.
2820-196TH St. SE
Issaquah, WA 98029 USA
Washington state Orthoptera, tropical katydids

PRETE, DR. FREDERICK R.
Vision Tech, Inc., 7833 Lotus Ave.
Morton Grove, IL 60053 USA
Praying mantic behavior, vision, & neuroethology

SCHÄDLER, HR. MARTIN
UFZ- Center for Environmental Research
Department of Community Ecology
Theodor-Lieser-Str. 4
D-06120 Halle, Germany
Ecology, conservation, nymphal development, faunistics, biogeography of European Orthoptera

SCOTT, MR. RALPH D.
2726 Shaia Way
Billings, MT 59101 USA
Biogeography, biological illustration, illustrating Thomas Walker and John Capinera's Field Guide to Grasshoppers, Crickets, and Katydids.

SHOR, MR. NATHANIEL
Beth El B, P. O. B. 1365
Beth El 90628, Israel
Grasshoppers as food in religion

TEPPNER, FR. INGEBORG S.
Institute for Zoology
Karl-Franzens University
A-8010 Graz, Austria
Katydids of Panama, sensory ecology of katydids

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