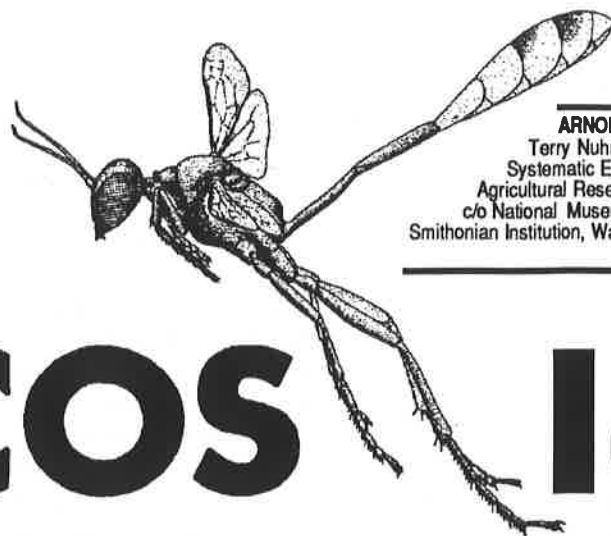


APRIL 1989

A FORUM FOR ACULEATE WASP RESEARCHERS

SPHECOS 18



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EDITORIAL FRASS

Not to be outdone by the spiffy looks of our sister newsletter **Melissa** edited by Ron McGinley and Charles Michener, we have accepted the challenge and entered the world of Macintosh with this issue of **Sphecos**. Could this be the beginning of Newsletter Wars? Using a Macintosh II, Ready Set Go! (a desktop publishing program) and a scanning system, we have embarked on an entirely new look for **Sphecos**.

The scanning system, for those of you who may be unfamiliar with this technology, involves a machine that scans (or reads) typed copy, or drawings, into the computer system, allowing them to be inserted directly into the document being produced. Previously we retyped your ms. into the computer, which was quite time consuming. By scanning your material, much typing time is saved, although the system isn't perfect and many errors must be corrected. Figures scanned into the computer can be cleaned up or modified on screen. The scanning system only works well on text material submitted in type written form. So if you would like your future articles scanned into **Sphecos**, please use a typewriter for the copy, or if computer generated, printed in *letter quality* mode with words spaced well apart. Some draft mode printing cannot be scanned.

Terry Nuhn is rapidly becoming an expert on the Macintosh and he is responsible for putting this entire issue in the computer. We must

acknowledge the help of Britt Griswold. He gave us initial training in the Macintosh and helped get us started with **Sphecos** 18.

Esthetics aside, there are two serious reasons for adopting the new three column format. The mailing list for **Sphecos** is becoming gargantuan (572 people - larger than some journals!), and mailing costs for an issue of nearly 50 pages in the old format were becoming horrendous. For example it cost nearly 4 dollars to airmail a single copy of the last issue overseas! If you multiply that by 250, the approximate number of foreign recipients, the mailing cost is staggering without including all of the North American mailings that cost in the neighborhood of 1 dollar each. Because of the ever tightening US government budgets, the Systematic Entomology Laboratory simply cannot afford this kind of expense any longer. By using a 3 column format and a smaller type font, **Sphecos** can be reduced in size considerably. The considerable weight saving due to fewer pages will reduce mailing costs. And an issue of fewer pages means that it will be possible to have sufficient copies reproduced to cover our mailing needs.

Even so the cost of airmailing **Sphecos** overseas may be deemed prohibitive by the leadership of SEL and the day may come when the newsletter will have to be sent surface mail. That may result in a delay of 6 or even 8 weeks between mailing and receiving **Sphecos** by some readers. I hope that that day never comes.

Back Issues of Sphecos

We have stockpiles of most of the past issues of **Sphecos**, and we would like to reduce the quantities. Several issues are completely gone (3, 7, 13) and several others are in short supply (1, 2, 11, 12, 14, 17), but we have plenty of the remainder. If you lack any back issues send us a letter listing those you would like to have and we'll mail them off to you.



RESEARCH NEWS

Kalle Remm (Institute of Zoology and Botany, Vanemuise 21, Tartu, Estonia, 202400 USSR) is interested in the faunistics of Estonian wasps, and is currently working on Sphecoidea.

Lloyd Elghme (Pacific Union College, Angwin, Calif. 94508-9797) reports: "The *Diodontus* revision is finally published. This has been a fascinating and frustrating experience. Something, like writing a book. As one author so aptly stated, 'Writing a book is like having a baby, easy to start but difficult to finish.' The same could be said about doing a generic revision. One of the great frustrations has been that of not having sufficient time to devote to research. My life as a teaching professor in a small college

has been very rewarding but I have never been able to devote the time to research that I would like. Now, after 35 years of classroom teaching, both my wife and I are going to retire in June of this year. We are moving to the State of Washington, near where I spent my childhood years, and as soon as we get settled, I plan to do lot more collecting and studying. I will be taking a good sized collection with me and I expect to add to it considerably over the next few years. The unsolved problems of *Diodontus* are still a challenge to me and I will continue to collect specimens and gather data in hopes of finding solutions."

Eric Hammerström (Backgatan 12, S-614 00 SÖDERKÖPING, Sweden) writes: "I am an amateur entomologist, especially interested in social aculeate wasps. I was born in 1962 and live in Söderköping, a little town on the east coast of Sweden, 16km southeast from the city of Norrköping and 180km southwest of Stockholm. My profession is telephone operator. For several summers I have studied and photographed European Vespinae. In particular, I have been looking for differences between the species of *Dolichovespula* in the construction and location of their nests. In that regard the literature could be better. Last summer I also began looking at ants."

M.W.J. Crosland (School of Biological Sciences, University of New South Wales, P.O. Box 1, Kensington, N.S.W. AUSTRALIA 2033) announces: "I just have received a Fellowship to work on the biology and control of the wasp, *Vespula germanica*, in Australia."

Christlan Schmid-Egger (U. Kirschbäumlebuck 18, D-7840 Müllheim, West Germany) and **Reinhold Treiber** (Eugen-Nägele-Str. 29, D-7290 Freudenstadt) are working on the distribution and ecology of *Polistes bischoffi* Weyr. in southern Germany. Any information about this wasp would be welcome.

Chris Starr (Dept. of Horticulture, Univ. of Georgia, Athens, GA 30602) says: "My revision of *Parischnogaster*, the largest and best studied of the six stenogastrine genera, is nearing completion. One effect of this will be to triple the number of valid species, not terribly surprising when we consider that the genus had never been revised before and consists of inconspicuous wasps in Southeast Asia. What is surprising is the large number of Philippine endemics among the new species. It was very good luck that I collected in so many parts of the Philippines, with special attention to stenogastrines. Seike Yamane and I are planning to revise the second largest genus, *Eustenogaster*, but it will probably take us quite a long time.

"Presently, I am working full-time on the behavior and chemical ecology of a weevil (that's right, one of those insects with the sharp parts at the opposite end), while struggling to wrap up the previous year's wasp taxonomy in an orderly way."

Fernando Fernández C. and **William A. Cubillos** (Apartado Aéreo 77038, Bogotá 2 D.E., Colombia) write: "We are undergraduates in Biology at the National University of Colombia at Bogotá, now preparing our senior theses on the Hymenoptera of Colombia Oriental, with special attention to social wasps. Although there is a great diversity of species in this part of the country, the paucity of keys and other identification materials is causing us considerable difficulty. We would be very interested in communicating with others who have interests similar to ours and with specialists who might assist us in identifying Hymenoptera."

S.K. Gupta (Zoological Survey of India, Northern Regional Station, 218, Kaulagr Road, DEHRA DUN - 248195, INDIA) reports "I have completed the systematic studies of the family Scoliidae from India. At the present, I am engaged in the systematics of the families Tiphiidae and Sphecidae from the Indian Subcontinent with special

reference to the Western Himalayan Region."

J.C. Felton (Karel Doormanlaan 197, 2283AM Rijswijk, The Netherlands) reports that his recent studies on *Gorytes laticinctus*, *Nitela* and the *Trypoxylon figulus* group are now published (see RECENT LITERATURE). Available time is now being applied to *Mimumesa unicolor* / *littoralis* in collaboration with George Else of the BM(NH). Progress is slow and any suggestions on morphological or ecological differences between these two would be gratefully received. In the future lies the possibility of returning to *Nitela* to look at the Iberian species in collaboration with Professor Gayubo at Salamanca.

Marc Tussac (Route du Clos du loup, Cidex 7521, France 31180-Castelmaurou) writes "Nous partons en voiture avec mon frère Hubert pour récolter des Hyménoptères durant trois semaines au Maroc du 28 avril au 21 mai 1989 (5000 à 6000 km allé-retour à partir de Toulouse). Nous allons explorer la zone littorale atlantique à partir de Kenitra jusqu'à Agadir -région qui nous a déjà donné de nombreuses nouvelles espèces-, puis les oasis pré-sahariennes comme Tafraoute, Ouarzazate, Zagora. Cette période de l'année est particulièrement intéressante pour les Eumenidae. Pourquoi pas un voyage dans deux ans, 'sur les pas de De Beaumont', dans le sud Algérien (Biskra, Montagnes des Aures, etc...) avec d'autres hyménoptéristes d'Europe ou d'autres continents !! me contacter (voiture et camping)."



MISSING PERSONS

Tom Muir (of Reston, VA)

Maury Walsh (of Columbus, Ohio)

Johan Billen (of Brussels, Belgium)
Larry French (of Davis, Calif.)
Laurence Packer (of Sydney, Australia)
D.B. Jayasingh (of Kingston, Jamaica)
Albert Giraldi (of Bethesda, MD)
Cristina Larsson (of Perstorp, Sweden)



NEW ADDRESSES

Steven Alm: Dept. of Plant Science,
 University of Rhode Island,
 Kingston, RI 02881.
Eric Eaton: 730 Riddle Rd., Apt.
 102N, Cincinnati, OH 45220.
S.K. Gupta: Zoological Survey of
 India, Northern Regional Station, 218,
 Kaulagarh Road, DEHRA DUN (U.P.)
 248195 India.
Darryl Gwynne: Dept. of Zoology,
 Erihdale Campus, Univ. of Toronto,
 Mississauga, Ont. Canada.
Jeffrey A. Halstead: 4886 E.
 Jensen Ave., Fresno, Calif. 93725.
Raimond V. Hensen: I. B.
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 Holland.
Jacques Petlt: rue des Combattants
 2, 4492 Bassenge, 041 86 4429
 Belgium.
David C. Post and Holly Downing:
 Dept. of Biology, Univ. of Wisconsin -
 Whitewater, Whitewater, WI 53190.
 (Congratulations! -edit.)
Hal Reed: Biology Research
 Laboratory, USDA/ARS, 1700 S.W.
 23rd Drive, Gainesville, FL 32604.



HELP NEEDED

John F. MacDonald (Dept. of Entomology, Purdue Univ., West Lafayette, Indiana 47907) writes: "I would like to ask a question pertaining to 'property owner's liability' relative to the existence of a colony of social wasps. Numerous home owners, who otherwise might enjoy observing a hornet or yellowjacket colony on their property have expressed concern over their personal liability in the event of a stinging episode. I have tended to discourage them from maintaining colonies that were situated in sites subject to human activity. Do any **Sphecos** readers know of a case in which legal precedent has been established relative to:

1) a 'hazard' stemming from a colony that had been **unknown** to a property owner, and

2) a 'hazard' stemming from a colony that was known but then **knowingly** not destroyed, either due to desire to enjoy it or to a reluctance to spend money to have it destroyed?

"I would very much appreciate hearing about any legal experiences and personal opinions of **Sphecos** readers, so that I might better deal with the questions that I receive pertaining to this matter. Thanks!"

Joan E. Strassmann, David C. Queller, and Colln R. Hughes (Department of Ecology and Evolutionary Biology, Rice University, P. O. Box 1892, Houston Texas 77251; (713) 527-4922; BITNET, STRASSM@RICE) are interested in measuring relatedness among nestmates in social wasps. We already have such measures for over 20 species in the following genera: *Polybia*, *Parachartergus*, *Mischocyttarus*, and *Metapolybia*. But we feel that a broad understanding of the role of relatedness in sociality can only come from more measures of relatedness in many taxa. We are particularly interested in collaborating with individuals who have extensive

behavioral data whose interpretation could be enriched by precise information on relatedness. Our laboratory is set up to measure relatedness using the method of Queller and Goodnight (**Evolution**, in press) on allozyme data. If there is enough allozyme variation at scorable loci, we can get an estimate of relatedness among nestmates (and a standard error) from as few as 10 colonies with 4 individuals per colony. An ideal would be 30 colonies with 10 individuals per colony. We would like to hear from colleagues who are interested in a collaboration to measure relatedness among nestmates. The specifics will need to be worked out in each case, but our general plan is to obtain wasps that are alive, or kept at -70° C (in an ultracold freezer, or on ice, or liquid nitrogen), and nest identities and information from a collaborator. We will do the allozyme work, and calculate relatedness, and then collaborate on the publication of the results in whatever way is mutually agreeable. We have just finished the allozyme work from our first collaborative venture with Stefano Turillazzi and Rita Cervo. We went to Florence (we were in the area anyway) to pick up specimens of *Polistes gallicus*, *P. ninfia*, *P. biglumis*, *P. dominulus* and 2 social parasites that Stefano and Rita had collected, and brought them back to the US in a liquid nitrogen container (mailing specimens in ice is another option). We plan to continue to collaborate with them, and hope that **Sphecos** can generate interest in collaboration from others.

Till Osten (Staatl. Museum für Naturkunde, Rosenstein 1, 7000 Stuttgart 1, West Germany) pleads "Help needed! I am looking for the translation of the Russian text in English, French or German of: A.M. Steinberg (1962) 'Colliidae' in: **Fauna of the USSR** 13, 185 p."

Eric Eaton (730 Riddle Rd., Apt. 102N, Cincinnati, OH 45220) writes: "We at the Cincinnati Zoo would be interested in obtaining a bulldog ant

colony and/or some exotic large solitary wasp species we can rear, or at least keep alive for a fairly long time. Scoliid wasps perhaps? We already have excess scarab larvae, if we could persuade a female wasp to oviposit. I think it would be nice to get some carton nests (*Chartergus*, etc.) for our insect architecture display, too. Can anybody out there help?

James Carpenter and Jun-ichi Kojima are involved in an NFS supported project on the Polistinae. "We'd like to request nest specimens, particularly of *Polybioides* and young phragmocytarus-nesting species. We're also going to include larval characters in the study (to be analyzed by Jun-ichi Kojima), hence we'd also like to request larvae, particularly of tropical species. It'd be preferable if they were fixed in Dietrich's first, but pickling in alcohol will also do. Finally, we don't have males of *Nectarinella*, *Asteloeca*, *Synoecoides* or *Occipitalia*, so if anyone has any we'd be grateful for their loan."

Colin Vardy (Dept. of Entomology, British Museum (Natural History), Cromwell Road, London SW7 5BD England) intends to complete his

revision of the pompilid wasp genus *Pepsis* in 1989 and would like to borrow all material not so far requested, please, EXCEPT that collected in the U.S.A. You can regard "named" material as effectively unnamed, since misidentification is the norm. (This does not apply to material named by Hurd for his 1952 revision of nearctic species). The sketch herewith will enable immediate separation of the genus from all other Pompilidae, except for 2 large, aberrant species of *Pepsis* from the Peruvian Andes/coast ("if in doubt, send"). Many thanks.



TRANSLATION

Origin and evolution of hymenopterous insects, by A.P. Rasnitsyn, 1980, has been translated into English. It is not yet available, but I have seen the first draft. When available, I will put a notice in *Sphecos*. - edit. (Proiskhozhdenie i evoliutsiia pereponchatokrylykh nasekomykh. Trudy Paleontologicheskogo Instituta. Vol. 174. Moskva: Nauka, 1980, 191 p.)

NOMENCLATURE

More on the Grammar of Species Names in *-fer* (and *-ger*) by

George C. Steyskal

(Cooperating Scientist, Systematic Entomology Laboratory, USDA, c/o US National Museum of Natural History, Washington, DC 20560)

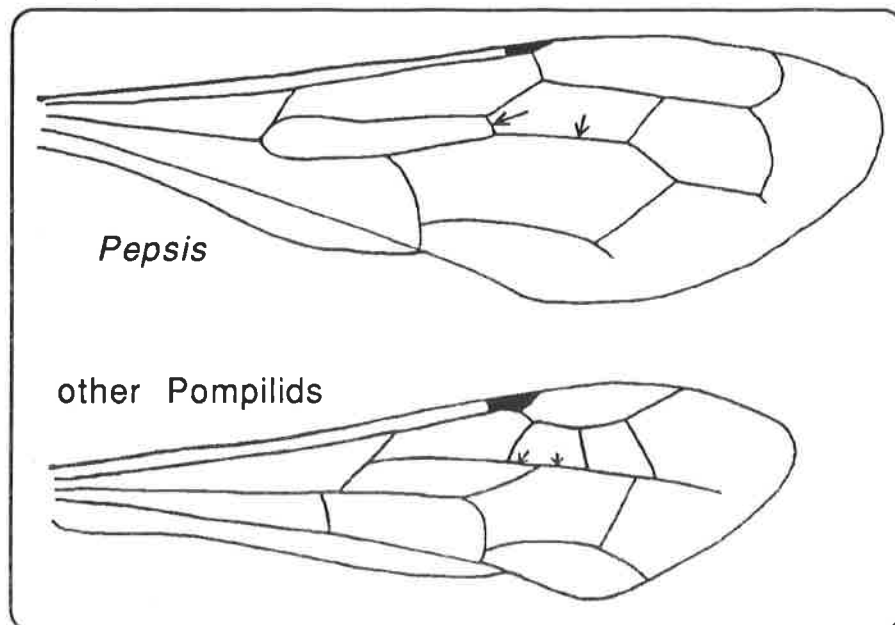
I was somewhat amazed when reading Cameron's notes on "FER VERSUS -FERUS" (*Sphecos* 17: 8) to find that the largest part of the article was concerned with the meaning of 'latinize,' inasmuch as I always thought, and as Cameron abundantly makes clear, that the problem of the title subject has nothing to do with 'latinize,' although there are problems enough properly concerned with the meaning of that verb.

I would disagree with Cameron's statement that "there are 179 genuine Latin adjectives in *-fer*." I find *agaricifer*, *annulifera*, and *auriculiferus* in the first few pages of the index volume of the **Catalog of Hymenoptera of America North of Mexico** as species names, but I do not find them in **Harper's Unabridged Latin Dictionary**, where they would occur with *-fer*. I do not think that makes them less "genuine Latin," although they are Modern Scientific Latin and one is incorrect.

It should also be noted that words in *-ger*, *-a*, *-um*, another quite sizable category, are grammatically equal to those in *-fer*, *-a*, *-um*.

There has also been some trouble with the part of speech of these names, viz., it has been held that they may be nouns (substantives). This somehow got into the latest edition of the Code of Zoological Nomenclature in the Example to Art. 31.(b).(i). All adjectives in Latin and many other languages may upon occasion be treated as nouns (as genus names they are always nouns); in fact, Latin grammars treat both nouns and adjectives as "names" (*nomina*), viz., *nomina substantiva* (names in substance) and *nomina adjectiva* (names applied to another name). Words derived from other

In *Pepsis*, "A" is less than 1/2 "B"; in others, more.



words with the formants *-fer* and *-ger* (as well as many others with such formants as *-anus*, *-ensis*, *-ivus*) are adjectives by virtue of their formation, even though in some cases, as in *armiger*, they were used more often, at least in classical Latin, as nouns than as adjectives. But they still remain basically adjectives by formation.

I suggest that the only plain, simple, and time-saving solution to the problems with *-fer* and *-ger* names is to consider all nomenclatural species-group names in this category as adjectives agreeing with the genus-name to which they are attached in the way such words are declined in all Latin grammars, viz., *-fer*, masc.; *-fera*, fem.; and *-ferum*, neut.; *-ger*, masc.; *-gera*, fem.; *-gerum*, neut. This makes it unnecessary to find out whether or not the author was mistaken in his spelling, used the name as a noun, or was mistaken concerning the gender of the genus with which he used it. See also the Code, Art. 32.(d),(ii), and Example.

Incidentally *-icola*, *-icola* and *incola*, sometimes also used incorrectly with *-us* ending, present a similar problem, but a different one inasmuch as such words are nouns of masculine gender and to be used as such in apposition and therefore invariable.

Names Changes to be Avoided: Examples in *Polistes* and *Bombus*

by

Charles D. Michener

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The principal function of scientific nomenclature is to make it possible for each of us to know what organisms others are talking or writing about. Changes of names are therefore unfortunate. Sometimes they are necessary, as when two "species" are found to be conspecific (one of the two names loses out), or when with improved knowledge a species is moved from one genus to another.

Taxonomists can always keep track of almost any name change. Nontaxonomists can learn about and accept necessary name changes.

They may ridicule taxonomists for making too many changes, something that systematists do not need when it is hard to gain support for our sort of work. But a certain number of name changes are necessary because of advances in the biological knowledge and there is nothing to do about it. The nomenclature reflects the status of the science. The number of changes, however, would be moderated by recognizing fewer, larger genera.

"Simple" Name Changes: There is a large class of name changes that most of us accept even though they are regrettable. These are the changes resulting from restudy of type specimens and other activities of persons revising groups. One often discovers that a widely used name is a junior synonym of an older name. Unless the species involved is extremely well known, like *Drosophila melanogaster*, most systematists make such changes with little complaint. If thy name *alpha* (1940) represents the same species as the name *beta* (1910), the law of priority says that we use *beta*. This is part of the bookkeeping needed to keep track of the nomenclature. No confusion results if for years after discovery of the synonymy, some people continue to use the name *alpha*; we know the species that is intended. If a very important name like *D. melanogaster*, is found to be a junior synonym, one can (and should) record the problem but request the International Commission on Zoological Nomenclature (ICZN) to set aside the law of priority for the sake of stability.

Although it is nomenclature and not biology, I appreciate and encourage work like that of Day (1979) designed to determine the identity of old type specimens. Until such work is done, the old names are always a threat to commonly used names that might turn out to be junior synonyms.

"Double-barrelled" Name Changes: There is one kind of nomenclatural change that must be avoided, preferably always, but at least when it involves species that are well known in the biological literature outside of systematics. This is the shift of a name from one species to another. Such changes result from ancient misidentifications. Examples

from Day (1979) are as follows:

Polistes gallicus of authors = *P. dominulus* (Christ)

Polistes foederatus Kohl = *P. gallicus* (L.)

Thus the much-used Linnean name *gallicus* is transferred from one species to another. There are dozens of important papers on dominance interactions, physiology, etc., of the *P. gallicus* of authors, not to mention secondary references in texts on behavior, etc. If the change advocated by Day is accepted, it will be decades before anyone can easily tell what is meant by the name *Polistes gallicus* because different people will accept the change at different times. The confusion has already started, with a few authors following Day, others not.

One could say that all authors should preserve voucher specimens to verify the species on which they worked, and that such specimens would clarify the confusion resulting from changing names. Of course for various reasons it is desirable to preserve voucher specimens. But most readers cannot be expected to examine vouchers. The reason we use names is to substitute for showing actual specimens in describing a study.

As noted by Macfarlane (1988), similar problems exist in *Bombus*.

Bombus terrestris of authors = *B. audax* (Harris)

Bombus lucorum L. = *B. terrestris* L.

In this case Day does suggest recourse to the ICZN. Physiological and behavioral papers on *terrestris* of authors are numerous, and both species are well known to systematists. As Macfarlane notes, similar problems involve the name *Bombus muscorum* L., which is transferred by Day to another species, *B. humilis* of authors.

Transfer of a name from one species to another in cases such as these serves no scientific purpose, and is a disservice to the field of systematics. Many biologists already regard taxonomy with skepticism, and there is no point in verifying their impression. We need to show that we are scientists, who, as a minor part of our work, devise, use, and if necessary change names for the purpose of making it possible for everyone to know what others are talking about. Transfer

of a name confounds these objectives.

One should never promptly accept transfer of a name from one entity to another and it is presumptuous to insist upon such a change. Instead, one should follow current usage, while noting the possibility of a change. No confusion results from such a course. Those concerned with maintenance of current usage should request ICZN to conserve that usage in the interest of stability. ICZN should then balance arguments for stability against those for inflexible application of the law of priority. Day's paper appeared ten years ago and has not led to appropriate action by the community of biologists. Macfarlane indicates that action is imminent on the *Bombus* cases. Is it not time that persons interested in *Polistes* take similar action in the case of *Polistes gallicus*?

References

- Day, M. C. 1979. The species of Hymenoptera described by Linnaeus in the genera *Spheg*, *Chrysis*, *Vespa*, *Apis* and *Mutilla*. *Biol. Jour. Linnean Soc.* [London], 12:45-84.
- Macfarlane, R. P. 1988. *Bombus terrestris* (L.)--Does a change in its usage (sic) really serve science? *Melissa*, no. 3: 7-9.



T-Shirts Available

I have about 10 Aculeate Wasp Research Team T-shirts left, all size large, all in silver gray (see *Sphecos* 17:20). The wasp is done in two colors (abdomen red) and it looks great! If you want one, send me \$11. More shirts can be printed if there are sufficient orders. The Ashmead Club/Club Ashmead shirt was also printed, but the orders were so few that there are no extras (see *Sphecos* 17:21). However if I get an order for 12 we can run that one off again. The Ashmead shirt is truly unique and can be worn with pride, apprehension, and a devilish smile. Let me (**Arnold Menke**) know if you are interested in either shirt.

FORUM

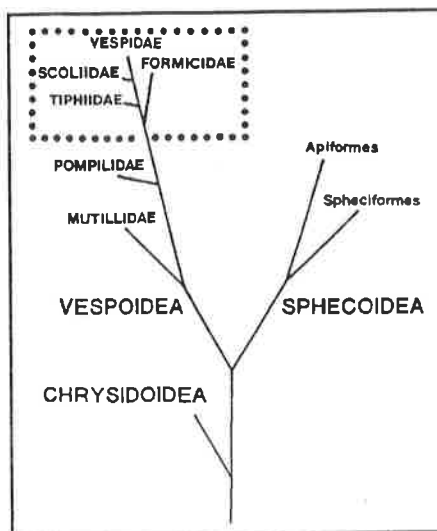
Brothers' Aculeate Phylogeny by Tom Plak

(Farmacologisch laboratorium, Univ. of Amsterdam, Meibergdreef 15, 1105 AZ Amsterdam Zuidoost, Netherlands)

Good question in *Sphecos* 17, Justin! Brothers (1976) has provided impressive morphological arguments for the close relationship of vespine and scoliid wasps, and an additional toxicological argument (kinins in the venom) has been presented recently (see *Sphecos* 16:28).

For Justin Schmidt and me it was a surprise to find kinins in ant venoms too (*Comp. Biochem. Physiol.*, in press), and recently we found kinins in tiphiid and myzine venoms. No kinins are known in other aculeate groups, but the Chrysidoidea have not been investigated.

Although Brothers (1976) and Königsmann (1978) said that the Tiphidae and Scolidae and not closely related, both groups share a few important non-morphological characters: behaviour, egg deposition, and venom composition in particular. Finally, many tiphids look like scoliids. Based on Brother's classification, I would like to propose a modification in the place of tiphiid wasps as shown in the accompanying diagram. Justin and I look forward to the reactions of others interested in this subject. [Tom, the name Apoidea has priority over



Sphecoidea - see Michener, 1986, *J. Kansas Ent. Soc.* 59: 219-234 - edit.]

The Subspecies Debate by

Robin Edwards

(Rentokil Ltd, Felcourt, East Grinstead, West Sussex RH19 2JY)

Oh dear, here we go again! Not content with giving us TWO names for many vespine subgenera (ie. a "subgenus" name and a "species-group" name) we now have two names for some subspecies. Is it worth all the trouble, I ask myself - in the past, *Vespa tropica deusta* was simply:

"*Vespa tropica deusta*",

but in the future we will have to refer to:

"*Vespa tropica*, north Philippine colour-form (= *V. t. deusta*)".

Ah well, at least there is comparatively little written about these hornets, so it will not become too much of a chore.

Having said that, I do appreciate the value of getting rid of some of the subspecies names - there are far too many as my 1980 Check List made clear (in fact I produced it for this very purpose). Therefore I am in agreement with most of Michael Archer's proposals, but I do hate the idea of having TWO names for some hornets. [but Robin, if *deusta* has been relegated to simple synonymy with *tropica*, then you only have one name - edit.] Surely it is not ESSENTIAL for EVERY subspecies name to be diligently eradicated like cockroaches in a kitchen. Why not keep just a FEW of the old subspecies names, like *anthracina* and *unicolor*, for the "difficult to resolve" forms? [this smacks of sentimentalism, a trait that has no place in science - edit.]

More on *Vespa tropica* subspecies

by

Christopher K. Starr

(Dep't of Horticulture, Univ. of Georgia, Athens, GA 30602)

Discussions by Mike Archer (*Sphecos* 17: 9-11) and Bob Jacobson (17: 11-12) of subspecies problems in *Vespa* with special attention to *V. tropica* prompt me to add

three comments of my own. Mike's physical characters for separating *V. tropica* and *V. philippinensis* are interesting but even without them there can be little doubt that the latter is a good species. The ranges of the two overlap broadly in Luzon and the Visayas islands and *tropica* is present at all of the localities where I have collected *philippinensis*. Anyone who maintains that they are conspecific must plausibly say how their striking color differences are maintained without genetic isolation. In addition, the only *V. philippinensis* colony examined to date (*Insectes Sociaux* 34: 1-9, 1987), was several times as big, I believe, as any *V. tropica* colony reported from Southeast Asia.

Setting aside *V. philippinensis*, I too have long doubted that all forms of *V. "tropica"* are conspecific. It is hard to accept that a single species of social wasp extends over such a range, especially the latitudinal range from Honshu to New Guinea. I am also struck by the apparent variation in colony and nest size within this range. The largest mature colony collected by Makoto Matsuura in Japan had just 40 adults (*Bull. Fac. Agric. Mie Univ.* 69:1-131, 1984), smaller than most temperate *Polistes*. On the other hand, of the several immature colonies which Justin Schmidt and I dug up on Luzon, the largest had 450 cells and roughly 200 adults. Two others also had well over 40 adults. *V. "tropica"* seem to be rather generalized ground-nesting vespines, which may tend to obscure specific differences between some forms.

The subspecies *V. tropica cebuana*, described from two females by Kojima and Reyes (*Kontyû* 52:260-261, 1984), is an artifact. I have seen the paratype, which does indeed have the described color anomaly, but I also took the trouble to borrow the series of Cebu females from the University of San Carlos collection at Cebu city. They all match *V. tropica anthracina* Bequaert, the form found throughout Luzon and the Visayas (**NEW SYNONYMY**).

Snelling on Subspecies

by

Roy Snelling

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The fine art of naming subspecies is gradually dying out, a distinct blessing. Someone once noticed that (to paraphrase) the subspecies is the refuge of those of little faith. Yes, I have, in the past, named a few; all are now, I think, in synonymy or recognized as distinct species.

The "incipient species" concept was ok, but generally couldn't be validated; most "subspecies" appear to be little more than geographical segregates that represent selected points of clinal variation. However, we should not be too harsh on those who named subspecies in the past; it's always easy to assume much of significance when one knows little (i.e., hasn't enough material). Those who would describe subspecies now, I think should be prepared to offer some reasonable proof that their decision is sound.

Fortunately, the infrasubspecific form is now a dead issue, one that has not been much of a problem for bee and wasp taxonomists; it has been a nightmare for myrmecologists, however, and the lepidopterists are really "out to lunch". This doesn't mean that I approve of the way the new ICZN Rules are written. As a matter of fact - I DON'T. In my view, the new Rules have created a whole new set of problems that will only generate new confusion and wrangling. If the Rules had simply stated that infrasubspecific taxa proposed after a certain date would have absolutely no nomenclatural status and let it go at that, then I wouldn't have any quarrel. But, people (especially petty bureaucrats) must meddle. So, an infrasubspecific name proposed in 1898 is available for purposes of homonymy but not for priority. That's silly and contradictory. [I agree! - edit.] If that name was raised to subspecies rank in 1910, it becomes available for purposes of priority as of that date and, additionally, is ascribed to the author who did so. That is silly. What would

happen if a subsequent author in 1915 decides the thing is merely a variety (in other words returns it to its original status) is unclear; **presumably** the 1910 action is binding. There is some confusion, too, as to what constitutes a "valid" elevation to subspecific from infrasubspecific status. All in all, I think we were better off before the "improvements" were made in the Code. A pox on tinkers!

On Starr and Tribal Names

by

Roy Snelling

I agree with ASM (editor's insert in Starr, *Sphecos* 17:13). Enough. As ASM notes, it's time for others to get off it and develop and express their views rather than live vicariously off those of us who are rapidly acquiring a reputation (possibly deserved) for being contentious and tendentious.

Yet more on Tribes in Pollistinae

by

James Carpenter

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Hey, hey, hey. Those who would use tribal names in the group must use "Epiponini" for the group Richards termed "Polybiini". Epiponinae Bequaert, 1918, has priority over Polybiinae Bequaert, 1922. The latter changed the name, evidently at the behest of some colleagues, saying in a footnote that he regarded this an unimportant. The Code rules otherwise. Hey, hey, hey.

Chryridoidea / Bethyloidea

by

Arnold S. Menke

Carpenter's comment on Epiponini reminded me of a similar issue. There are many workers out there in "wasp landia" (borrowed from Lubo Masner?) who still cling to the superfamily name Bethyloidea in spite of the fact that Chryridoidea is the oldest name and under the Code must be used.

Vespida vs. Hymenoptera

by

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Johann Nepomuk von Laicharting, Professor of natural history at Innsbruck, Austria, published his "Verzeichniss und Beschreibung der Tyroler Insecten" in 1781-84 (2 volumes in one). It was published by Fuesly in Zurich. Vol. 1, dated 1781, contains i-xii + 248 pages. Vol. 2, dated 1784, contains i-xiv + 176 pages. As far as I am aware, this work contains the first classification of arthropodan orders using typified ordinal names (those derived from or based on generic names). I haven't read the book because my German is not good enough, but the ordinal names can be quite easily repeated here; they are from volume 1, p. ii-v:

- I. Scaraboides. Kaferartige Insecten (Coleoptera Linn., Geoff, Eleuterata Fabr.)
- II. Grylloides. Gryllenartige Insecten (Coleoptera Linn., gen. 218, Hemiptera Linn., gen. 219-220, Coleoptera Geoffr., Ulonata Fabr.)
- III. Cimicoides. Wanzenartige Insecten (Hemiptera Linn., gen. 222-230, Aptera Linn., gen. 265, Hemiptera Geoffr., Ryngota Fabr.)
- IV. Papilionoides. Schmetterlingartige Insecten (Lepidoptera Linn., Tetraptera alis farinaceis Geoffr., Glossata Fabr.)
- V. Libelluloides. Wasserjungferartige Insecten (Neuroptera Linn., gen. 234-240, Tetraptera alis nudis Geoffr., Synistrata Fabr.)
- VI. Vespoides. Wespenartige Insecten (Hymenoptera Linn., Tetraptera alis nudis Geoffr., Synistrata Fabr.)
- VII. Musdoides. Fliegen-artigen Insecten (Diptera Linn., Geoffr., Antliata Fabr.)
- VIII. Cancroides. Krebsartige Insecten.
- IX. Aranoides. Spinnenartigen Insecten.
- X. Oniscoides. Asselartigen Insecten.

The system is repeated in the second volume, though with the names changed: Scarabei, Grylli, Cimices, etc.

Rohdendorf (1977) was the first person to propose adopting Vespida as the ordinal name for what has always been called Hymenoptera. Rohdendorf's paper was reprinted in English in my proposal to the International Commission on Zoological Nomenclature (Rasnitsyn, 1982, Bull. Zool. Nomcl. 39: 200-207) on regulating the names of taxa above family group names.

Basically Rohdendorf's thesis is that since familial and tribal names are based on generic names, it is only logical to extend this typological approach to names above the rank of family. We adopted Laicharting's ordinal names in our book "Development History of the Class Insecta" (Rohdendorf and Rasnitsyn, 1980, Trudy Paleon. Inst. 175). In my opinion the typified (and thus codified) approach to forming ordinal names avoids or reduces the arbitrariness in name formation that the Code expressly promotes for lower taxa. Why shouldn't ordinal names conform to the same regulations as family names?

**SCIENTIFIC NOTES**

**Mutillid Wasps of Brackenridge
Field Station, Travis Co., Texas**

Compiled by
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(Dept. of Biology
St. Edward's University)

Determinations by
Donald G. Manley
(Dept. of Entomology
Clemson University)

Brackenridge Field Laboratory (BFL), 5 miles west of downtown Austin, supports a rich mutillid fauna with 28 species recorded thus far. Mutillid

diversity is tied directly to the tremendous diversity of bees and wasps found at BFL. These 28 species are listed below, along with their active periods as obtained from collection dates. Abbreviated active periods are due to a paucity of specimens for several species. This list includes a new Texas state record, *Pseudomethoca nudula* Mickel. Previously it was known only from New Mexico. I have also picked up this species at Pedernales Falls State Park, which is about 30 miles west of Austin.

MUTILLID (ACTIVE PERIOD)

1. *Timulla leona* (Blake)
(May-August)
2. *Timulla oajaca* (Blake)
(February-June)
3. *Ephuta sudatrix* (Melander)
(July)
4. *Ephuta* sp. (August)
5. *Sphaerophthalma a. auripilis* (Blake)
(April-October)
6. *Sphaerophthalminae* (August)
7. *Pseudomethoca brazoria* (Blake)
(May-October)
8. *Pseudomethoca frigida* (Smith)
(June-July)
9. *Pseudomethoca gila* (Blake)
(May)
10. *Pseudomethoca ilione* (Fox)
(May-October)
11. *Pseudomethoca nudula* Mickel
New Texas Record
12. *Pseudomethoca oceola* (Blake)
(April-November)
13. *Pseudomethoca propinqua*
(Cresson) (July)
14. *Pseudomethoca simillima* (Smith)
(March-September)
15. *Myrmilloides grandiceps* (Blake)
(April-November)
16. *Dasymutilla arcana* (Mickel)
(July-August)
17. *Dasymutilla birkmani* (Melander)
(April-August)
18. *Dasymutilla bollii* (Fox)
(May-October)
19. *Dasymutilla creon* (Blake)
(June)
20. *Dasymutilla electra* (Blake)
(May-June)
21. *Dasymutilla klugii* (Gray)
(January-October)
22. *Dasymutilla meracula* Mickel
(May)

23. *Dasymutilla perilla* Mickel (June)
24. *Dasymutilla quadriguttata* (Say) (May-October)
25. *Dasymutilla scaevola* (Blake) (April-November)
26. *Dasymutilla texanella* Mickel (April-September)
27. *Dasymutilla vesta* (Cresson) (April-September)
28. *Photopsis* sp. (June)

**First Record of the Spider Wasp
Genus *Episyron* in Cuba
(Hymenoptera: Pompilidae)**

by

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and

Coralla S. Sánchez A.

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Episyron is a cosmopolitan genus, occurring in all major zoogeographic regions. The subspecies *conterminus posterus* (Fox) is encountered from Costa Rica to central California, eastward through southern Arizona, southern New Mexico and southern Texas to southern New York (Wasbauer and Kimsey, 1985, California spider wasps of the subfamily Pompilinae (Hymenoptera: Pompilidae). **Bull. California Insect Surv.** 26: 1-130). Elliott *et al*, 1979, (Preliminary annotated list of the wasps of San Salvador Island, the Bahamas, with a new species of *Cerceris* (Hymenoptera: Tiphiidae, Scoliidae, Vespidae, Pompilidae, Sphecidae). **Proc. Entomol. Soc. Washington**, 81: 352 - 365) collected a male (June, 1978) on Salvador Island. Below we present the first record of this genus from Cuba.

A male and a female were collected in Güines, Havana, on November of 1987 and December of 1988 respectively. Both pompilids were found while we were doing a study on resource partitioning in a community of sphecid wasps in a quarry. In this quarry there are many areas of bare ground where many species of bees and wasps were nesting.

During two years of collecting in the area, no other specimens were seen, nor were any found in Cuban collections. This suggests that *E.*

conterminus posterus is rare in Cuba.

The variation in color traits of this species (Evans, 1950, A taxonomic study of the nearctic spider wasps belonging to the tribe Pompilini Hymenoptera: Pompilidae). Part I. **Trans. Amer. Entomol. Soc.**, 75: 133-270. and Wasbauer and Kimsey, 1985).

Also, the male and the female are not different from those collected throughout its range. The front wing is nearly hyaline with a darker apical band. In the female, the anterior and middle legs are rufous but the posterior ones are bright rufous ferruginous, except the coxae and trochanters. In the male, the posterior pair are more reddish than others which are rufous, but less bright than in the female.

Of particular interest is a pale yellow band on the third tergum in both wasps as in some Texas and Florida specimens (H. E. Evans, pers. comm.).

The wasps have been deposited in the Instituto de Ecología y Sistemática, Ciudad Habana.

We gratefully acknowledge Prof. H. E. Evans (Colorado State Univ.) who confirmed the wasp identifications and kindly provided literature.

**An Exposed *V. germanica*
Colony Usurped by *maculifrons***
by

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On 20 May 1983, I discovered an incipient *Vespula germanica* colony, suspended from my front porch ceiling. I was unable to do more than make casual observations, due to existing commitments, but I was able to observe a few interesting events. Unfortunately, I had to remove the colony the night before a trip to Europe on 30 June. The nest had grown enough to hinder opening the door and potential house-sitters left no doubt that they "wanted it gone!"

The queen had conveniently started the nest just above and exactly between the two ends of an up-turned horse shoe that was nailed to the porch wall. I applied a spot of orange paint to an abdominal tergum, without disturbing the *germanica* foundress at

all. (Throughout her tenure, she displayed almost no notice of me, even during close-up examination of the nest and photography.) For five consecutive nights, however, I did not see her on her nest and I thought it had been orphaned. The night of 26 May found her coiled about the petiole on top of the comb and she assumed this posture nearly every night, until being usurped by a *V. maculifrons* queen on 3 June.

I first noticed the *maculifrons* queen the evening of 3 June, and immediately checked the area for the orange *germanica*; I found no evidence of her and could detect no damage to the nest. My early effort to mark the usurping *maculifrons* queen were futile. She became very agitated, running across the comb, shaking the nest strongly, disappearing behind the envelope, and even making brief flights off the nest. I eventually got a spot of blue on her right wing as she ran exposed across the comb. (She remained very agitated in my presence throughout her tenure, preventing close observations since she ran "wildly" across the comb and took brief flights off the nest when I ventured too close)

By the morning of 4 June, blue wing *maculifrons* had added her tan paper to the periphery of the envelope around the opening, reducing it to the extent that she barely could pass. From 11-16 June, blue wing *maculifrons* made daily envelope modifications that included nearly complete closure during the day followed by nightly removal of paper resulting in a nearly fully exposed comb by about 6 AM. (Such activity was in contrast to the original foundress) (Could this daily "closure" be associated with defense against usurpations?)

The first (still teneral) *germanica* worker was present at 5:30 PM on 21 June, "peacefully" in contact with blue wing *maculifrons* on the comb face. (I tried to mark her, but gave up when blue *maculifrons* became very agitated.) On 22 June, a dead (still soft, undamaged) *germanica* worker was beneath the nest and another *germanica* worker peacefully with blue *maculifrons* on the comb face. On 23 June, 3 *germanica* workers were observed, making occasional flights,

and peacefully interacting with blue *maculifrons* (She still became very agitated when I got too close).

I collected the entire colony at 9 PM on 30 June and placed it in a freezer until my return in late July, when I finally got to examine the nest. Tearing open the envelope exposed the resident adults, two *germanica* workers and an unmarked *maculifrons* queen, but no evidence of the blue wing *maculifrons* that I observed the night of 29 June.

The events at this (unusually situated, but naturally occurring) colony provide further example of intraspecific and interspecific usurpations of incipient *Vespula* colonies, and may represent the first evidence of *maculifrons* taking over a *germanica* colony. I found it interesting, but frustrating, that the usurping *maculifrons* queen remained so agitated in my presence. Perhaps such a response to an external stimulus and near closure of the envelope opening during the day are attributes of usurping queens, in contrast to a founding queen.

A Much Overlooked Use of Old Paper Wasp Nests

by

Gregg Henderson

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For several years now part of my graduate research has required me to go to stranger's homes to ask for permission to collect any paper wasp (*Polistes fuscatus*) nests that I might find around. After a chuckle of two the homeowner usually grants permission for this intrusion and I busily go collecting. Old nests (of a previous year) are not collected but occasional observations of them are made. They sometimes are covered with spider webs, and the exposed cells, many of which are still capped, often appear to contain aged remnants of unsuccessful wasp brood. However, recently John Gorman, a beekeeper, brought an old paper nest to me and pointed out that the capped cells I believed to be the work of paper wasps were actually leaves freshly cut by leafcutting bees (Hymenoptera:

Megachilidae) into a circular pattern and packed into the "capped" cells. A short trip up the ladder to the eaves of my home quickly verified that this observation was not unusual (nests were collected on 27 September 1988). The bee was identified as *Megachile centuncularis* (L.) by Steve Krauth.

Of six old nests, three showed signs of occupation by leafcutting bee brood.

The largest nest collected had 217 cells of a possible 368 cells (59%) packed with leaves and bee brood. The second nest had 189 of a possible 250 cells (64%) occupied by leafcutting bee brood. And an examination of the third nest revealed that 115 of 148 cells (77%) housed leafcutting bees. Obviously, the shape and size of paper wasp nest cells look like good homes to adult leafcutting bees for the housing of their own young. Unfortunately for the brood, only about 6% of them apparently emerged as adults (indicated by the number of exit holes made by emerging adults), whereas the rest of the bee cells were occupied by dermestid larvae and psocids. It is not clear to what extent this latter finding was cause or effect. The nest brought to me by John Gorman was not so afflicted and each of the 44 wasp nest cells housed a single viable megachilid larva. A parasite, *Monodontomerus obscurus* Westwood (Torymidae), emerged from some cells.

The incidental utilization of old *Polistes* nests by megachilid bees has not to my knowledge been reported before. Leaving old nests hanging from buildings may turn out to be an efficient way of increasing wild bee populations for the purpose of crop pollination.

Additions to Social Wasps of Costa Rica

by

James M. Carpenter

I recently did some identifications for various people working in Guanacaste National Park, near Santa Rosa, in Costa Rica. This added some species to the list recorded by Chris Starr in *Sphecos* 15:13-20. The following notes will key them out using his key:

Agelaia cajennensis (F.), *areata* (Say) and *Apoica pallens* (F.) will fall at

couplet 6. The first two have the gaster yellow and black, but with strong scutal stripes. They may be separated from each other by the long prestigma in *cajennensis*. *Apoica pallens* has a white gaster.

Polybia flavitincta Fox will fall at couplet 9; it is larger than *rejecta* (i.e. forewing length > 8 mm), its wings are mostly yellowish, and its covered with dense golden pubescence. *Polybia raii* Bequaert will also fall at the couplet; its forewing is slightly infusate, not yellowish.

It should also be noted that some specimens of *Polybia diguetana* have yellow on the metanotum. The only reliable way of separating this species from *occidentalis* is the shape of the petiole (just under one half as broad as its length posterior to the suspensory ligament in *digueta*; broader in *occidentalis*).

Vespidae List

Guanacaste National Park, Costa Rica

records from identifications by
J.M. Carpenter
(for Ian Gauld, Frank Joyce and personal)

EUMENINAE

Euodynerus crypticus (Say)
Leptochilus tropicanus Parker
Minixi mexicanum (Saussure)
Monobia angulosa Saussure
M. nigripennis Saussure
Montezumia azurens (Spinola)
Omicron agressor Soika ?
Pachodynerus nasidens (Latreille)
P. praecox (Saussure)
Pachymenes aztecus (Saussure) ?
P. near ghilianii olivaceus (Saussure)
Parancistrocerus fulvipes (Saussure) or near it
Parazumia n. sp.
Pseudodynerus quadrisectus aztecus (Saussure)
Stenodynerus n. sp. near *farias* (Saussure)
S. temoris Bohart
S. undiformis Bohart
Zethus aztecus Saussure
Z. dreisbachi Bohart & Stange
Z. fuscus (Perty)
Z. near gracilis Smith

Z. histrionicus Zavattari
Z. spinosus Saussure
Z. strigosus Saussure
Zeta argillaceum (L.)

POLISTINAE

Agelaia areata (Say) *
A. cajennensis (F.) *
A. myrmecophila (Ducke)
Apoica pallens (F.) *
Brachygastra mellifica (Say)
B. smithii (Saussure)
Metapolybia aztecoides Richards
Mischocyttarus angulatus Richards
M. immarginatus Richards
M. melanarius (Cameron)
Parachartergus fraternus (Gribodo)
Polistes canadensis (L.)
P. carnifex (F.)
P. dorsalis (F.)
P. instabilis Saussure
P. major Beauvois
P. pacificus F.
Polybia diguetana Buysson
P. flavitincta Fox *
P. occidentalis (Olivier)
P. raii Bequaert *
P. rejecta (F.)
Synoeca septentrionalis Richards

* indicates a species not listed in C. K. Starr's key to the Polistinae of the park (1987, *Sphecos* 15). *Polistes erythrocephalus* Latreille was also reported from the park in that key.

Note on the Biology of *Zethus porteri* Stange (Vespidae: Eumeninae)

by

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The following brief observations were made on a hillside covered with scrubby, xenophytic vegetation on the outskirts of the city of Cochabamba in Bolivia on the 24th-25th February 1982.

1) A female of this species was seen to enter a burrow in the ground. This female was captured as it emerged. Soon afterwards a male arrived and alighted at the edge of the burrow, then left and flew around a nearby burrow. The nest of the captured female was excavated. It was a simple curved shaft going straight down into the ground 0.4 cm in diameter and 8 cm

long. There were two lepidopterous larvae at the end of the shaft.

2) A male was seen standing at the edge of another burrow. A female was just inside the burrow; several times she poked her head out as if to leave: when she did so the male palped the female's antennae with its own. The female responded by retreating several times. Sometimes, as the female retreated, the male would poke most of its body into the burrow. Once the male chased off another male that approached too close. At last, the female emerged from the burrow; the male immediately mounted her and copulated briefly; the female then flew off. The male then entered the burrow but soon emerged again and began to fly around the nest site. A smaller male approached the burrow but was chased off by the larger male. The smaller male persisted and several times arrived at the edge of the burrow but was always chased off. Eventually, the larger male moved further away; the smaller male managed to approach the burrow and enter a couple of times without being chased away. Soon after, both males began to leave the vicinity of the burrow, returning at longer and longer intervals until they both disappeared completely.

Unfortunately, these observations could not be continued. After riots in the city the nervous military would not allow anyone on the hillside which overlooked the army barracks.

Remarks

This species belongs to the *hilarianus* group of *Zethus*, not the *smithii* group in which Stange placed it (Stange 1975), since the labial and maxillary palpi are reduced in both sexes. The labial palpi are 4-segmented in both sexes, the maxillary 3-segmented in the females and 4-segmented in the males. (The maxillary palpi of the males appear 3-segmented at first glance as the fourth segment is small and stub-like.) Dr. Willink confirmed this placement by kindly scanning the type series at Tucuman for me. Unlike other species in the *hilarianus* group which have a reddish ground-color, *porteri* is exceptional by being black except for some reduced pale yellow markings. Other similarly dark Andean Eumeninae

at Cochabamba are a *Cuyodinerus* sp.; a *Pachodinerus* sp.; *Montezumia ignobiloides* Willink and *M. koenigsmanni* Willink.

The only other biological record for the *hilarianus* group is for *hilarianus* Saussure which also nests in the ground, pre-empting nests of bees (Bohart and Stange 1965, p.16).

References

- Bohart, R.M. and L.A. Stange 1965. A revision of the genus *Zethus* Fabricius in the Western Hemisphere. Univ. Calif. Publ. Ent. 40: 1-208.
Stange, L.A. 1975. Los *Zethus* de Bolivia. Acta Zool. Lilloana 31: 77-98.

Sphecoid Wasps of Kerala, India

by

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and

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In a survey conducted in Kerala, India, 46 species of sphecoid wasps were collected and identified. This collection included the 8 species previously reported from this region (Fabricius, 1781; Bingham, 1897; Van der Vecht, *et al.*, 1968; and Sudheendrakumar and Narendran, 1985). In the collection there were representatives from 30 genera and 7 subfamilies. Among the species, *Liris subtessellata* and *Bembecinus pusillus*, and among the genera, *Ammoplanellus* and *Piyuma* are new records from India. The status of 13 species are kept in abeyance as they have been determined only up to the generic level for want of additional specimens.

The details of the species recorded in this study are presented in the following list.

SUBFAMILY AMPULICINAE

1. *Ampulex compressa* (Fabr.)(OR*)
2. *Ampulex* sp. A
3. *Tirogma caerulea* Westwood (NR*)

SUBFAMILY SPHECINAE

4. *Ammophila atripes* F. Smith (NR)
5. *A. laevigata* F. Smith (NR)
6. *Chalybion bengalense* (Dahlbom) (NR)
7. *Chlorion lobatum* (Fabr.)(NR)
8. *Parapsammophila erythrocephala* (Fabr.)(OR)
9. *Sceliphron coromandelicum* (Lep.) (NR)
10. *S. madraspatanam madraspatanam* (Fabr.)(OR)
11. *S. javanum nalandicum* Strand (OR)
12. *Sphex argentatus* Fabr. (NR)
13. *S. sericeus fabricii* Dahlbom (NR)
14. *S. praedator luteipennis* Mocsáry (NR)

SUBFAMILY ASTATINE

15. *Astata boops* (Schränk)(NR)

SUBFAMILY CRABRONINAE

16. *Dasyproctus buddha* (Cameron) (NR)
17. *Oxybelus* sp. nr. *agilis* Smith
18. *Piyuma* sp. (genus new to India)

SUBFAMILY LARRINAE

19. *Gastrosericus menoni* Sudheendrakumar & Narendran (OR)
20. *Gastrosericus* sp. nr. *wroughtoni* Cameron
21. *Larra vechti* Sudheendrakumar & Narendran (OR)
22. *Liris aurulentus* (Fabr.)(NR)
23. *Liris subtessellatus* (F. Smith)(NR)
24. *Liris* sp. nr. *aequalis* (W. Fox)
25. *Lyroda formosa* (F. Smith)(NR)
26. *Pison punctifrons* Schuckard (NR)
27. *Prosopigastra* sp. nr. *creon* (Nurse)
28. *Solierella turneri* Dutt (NR)
29. *Tachysphex bengalensis* Cameron (NR)
30. *Tachysphex* sp. nr. *pompiliiformis* (Panzer)
31. *Tachysphex* sp. nr. *tinctipennis* (Cameron)
32. *Tachytes modestus* F. Smith (NR)
33. *T. nitidulus* (Fabr.)(NR)
34. *Trypoxylon errans* Saussure (NR)
35. *Trypoxylon* sp.

SUBFAMILY PEMPHREDONINAE

36. *Ammoplanellus* sp. (Genus new to India)
37. *Carinostigmus congruus* (Walker) (NR)
38. *Polemistus raoi* Sudheendrakumar & Narendran (OR)

39. *Psenulus* sp.

SUBFAMILY NYSSONINAE

40. *Ammatomus albipes* (Bingham) (OR)
41. *Bembecinus pusillus* (Handlirsch) (NR)
42. *Bembix borrei* Handlirsch (NR)
43. *B. glauca* Fabr. (NR)
44. *Bembix* sp. nr. *ovans* Bingham
45. *Bembix* sp. nr. *latitarsis* Handlirsch
46. *Stizus rufescens* (F. Smith)(NR)

* NR = new record; OR = old record.

References

- Bingham, C.T. 1897. *The fauna of British India. Hymenoptera* vol.1, 579 pp.
- Fabricius, J.C. 1781. *Mantissa Insectorum* I. Hamb. et Kilonii 552 pp.
- Sudheendrakumar, V.V., and T.C. Narendran 1985. Alpha taxonomy of three new species of Sphecidae (Hymenoptera) from the Malabar region (India). *J. Ent. Res.* 9: 50-53.
- Van der Vecht, J., and F.M.A. Van Breugal 1968. Revision of the nominate subgenus *Sceliphron* Latreille. *Tijdschr. Ent.* 111: 185-255.

Comments on Sphecid Wasp Stinging Behavior

by

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Given the recent interest in sting evolution, I would like to relate two "stories" of supposed sphecid stinging behavior. The first incident took place around 1977 on St. catherine's Island, Georgia. Simply, a ornithology graduate student got stung on his neck as he walked out a cabin door. Evidently he swatted the wasp, causing it to briefly hit the ground before flying off. He swore it was *Sceliphron*, but of course I did not believe him. I should mention that *Sceliphron* nested all over this building and so this student was familiar with this wasp.

The second incident occurred last summer in Austin; my notes are recorded under Bio. Note No. 49-88. A good friend, Mad-Dog Gutzke, while sawing off a dead and broken limb had

a wasp fly at him (evidently out of the broken end) and sting him on the wrist. This intrigued me, so I went over to his place to investigate. Once there, the limb was located; the exposed end (5 cm in dia.) had a single pre-existing burrow penetrating longitudinally a short distance. Inside was a nest of *Trypoxylon* that contained three cocoons, of a size that suggested a moderately large species.

The sting caused Gutzke's wrist to swell noticeably and evidently the pain was impressive and long lasting. Okay, so it sounds like a vespid sting. But Gutzke has had many altercations with *Polistes* over the years. When stung he proceeds to grab and dismember every wasp remaining on the nest; evidently he has built up an immunity to their venom.

I can relate that moderately sized *Trypoxylon* have a very impressive sting. could it have been that a guarding female occupied that burrow? Is it just chance that both *Sceliphron* and *Trypoxylon* nest above ground, aggregate their cells, and prey on spiders?

If anyone asks, I state that sphecids do not sting. But when discussing the role of the sting in social evolution, I would have to qualify that statement. I expect no one has ever tested this question in sphecids. I also find it interesting that Gerling, Velthuis and Hefetz (Ann. Rev. Ent. 34: 163-90) list ten vertebrate predators of large *Xylocopa*. [Species of *Ammophila* can't sting a person. You can safely grab them with your fingers and remove them from a net. Apparently their stinger is too blunt to pierce human skin. - edit.]

New Distribution Records for *Pison*

(Sphecidae)

by

Arnold S. Menke

Since the publication of my revision of the New World species of *Pison* (1988, Contrib. Amer. Ent. Inst. 24:1-171), I have received additional material for study from several sources: Universidad Central, Maracay, Venezuela; Provincial

Museum of Alberta, Edmonton, Alberta, Canada; California Academy of Sciences, San Francisco; Henry Hespenehde, Dept. of Biology, Univ. of California (UCLA), Los Angeles; and Allan Hook, St. Edwards University, Austin, Texas. Some of the material represents new country or state records and these are tabulated below.

Pison agile

TEXAS, Travis Co.: Austin, BFL,
Aug. 9, 1988, A. Hook (USNM).

This is a new state record and extends the known range of *agile* in the US considerably southwestward.

Pison cameronii

GUATEMALA: Izabal Las Escobas,
May 1987, M. Sharkey (Alberta Mus.)

This is the first Guatemala record for *cameronii*.

VENEZUELA, Aragua: El Limon, 450 m,
June 18, 1972 (Maracay).

This is the first Venezuela record for *cameronii*.

Pison conforme

COLOMBIA, Valle: finca sn. Luis cr.
Candelaria, Feb. 25, 1976 (Maracay).

Pison cressoni

COSTA RICA, Heredia Prov.: La Selva
Biological Station, 3 km S Pto. Viejo,
July 16, 1982, March 29, 1988, H.
Hespenehde (UCLA, USNM).

Pison delicatum

COLOMBIA, finca Samaritano cr. Cali,
Oct. 6, 1975 (Maracay).

Pison eu

VENEZUELA, Aragua: El Limon,
June 17-27, 1972, May 31, 1972,
Feb. 20-22, 1981, two females, five
males (Maracay)

The clypeal lobe of one female is atypical. It is not indented at the middle and thus resembles *euryops*, but the facial measurements are correct for the species. The males are of particular interest because there is variation in the development of the flagellar tyli. In 2 males tyli are present on flagellomeres V-VII, in two others

they are present only on V-VI, and in the last specimen they are present on V-VIII (just a tiny tylus on VIII). The length of the tylus on flagellomere V varies from nearly as long as the article to only a short tylus near apex. When I described the species only two males were available and tyli were present on flagellomeres VI-VII in specimen from El Limon, Venezuela. The other male from Colombia had linear polished areas on VI-VII instead of tyli.

Pison longicorne

COSTA RICA, Heredia Prov.: La Selva
Biological Station, 3 km S Pto. Viejo,
April 2-4, 1984, March 25-31, 1988,
H. Hespenehde (UCLA, USNM).

VENEZUELA, Bolivar: Rio Surukum,
Carretera Sta., Elena Icabaru, 850m,
Jan. 19-31, 1985 (Maracay).

This is first record of *longicorne* from Venezuela.

Pison pilosum

VENEZUELA, Aragua: El Limon, 450 m,
June 18-26, 1972, May 21, 1973,
Nov. 16, 1973, Jan. 28, 1979, Nov.
19, 1985, males and females
(Maracay).

COLOMBIA, Valle: finca sn. Luis cr.
Candelaria, Mar. 6, 1976, female
(Maracay)

Pison pistillum

PAPUA NEW GUINEA: Sigi Camp
(between 3 & 4°S and 139 & 140°E),
Feb. 21, 1939, one female, L. J.
Toxopeus (Leiden Museum)
Woj Pulawski sent me this record.
This is the second known specimen.

Pison wojii

PAPUA NEW GUINEA, Madang Prov.:
Baiteta (12 km NW Alexishafen),
Dec. 9, 1987, two females, M
Wasbauer (CAS).

The clypeus is more strongly sinuate laterally than in type.



TECHNIQUES

Mounting Wasps from Alcohol by

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If specimens are collected into alcohol, which is usual for Malaise traps, care must be taken when they are prepared for mounting. If they are air-dried directly from alcohol, setae often adhere to the cuticle, obscuring many morphological structures. Air-drying also causes the soft tissues of the abdominal sternum to collapse and interesting characters are thereby lost. Critical-point drying avoids these problems and usually produces high-quality specimens, but this method is expensive and rather time consuming for large specimens. A simple method that achieves better or equal results is to immerse the specimens in 95% ETOH and 100% ETOH each for 24 hours, then in chloroform for two hours, after which time they are air-dried. This procedure stops the shrinking of soft membranes and all pilosity stands erect, away from the body. If sets of small cages or perforated polyester bags are used, the method is very rapid and great quantities of wasps may be processed in one run.

Others (e.g. Vockeroth 1966) have used xylene or amyl acetate instead of chloroform but the results are not as good.

An Improved Indicator Paper for the Detection of Hymenopteran Stings by

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Most wasp and bee researchers have had the misfortune to discover that an agitated colony will attack dark colors preferentially to lighter colors. In studying wasp/bee behavior it is sometimes important to know which individuals in a colony will attempt to sting an object (often times losing their life in the process), and if the initial

sting acts as an attractant. However, indicator papers that I am aware of are white, turning purple in response to the acid of the venom. Through some experimentation I have come up with an indicator paper that starts out purple and stains yellow once stung. This paper is an improvement over other papers that I am aware of since the wasps (or bees) will zero in on the paper itself and not the researcher.

PREPARATION

1. Dip filter paper in 0.1% Bromophenol blue solution (in H₂O)
2. While still damp, dip treated paper in Alconox detergent/H₂O sol.
3. Air dry

Recording Activity of Nest Building Solitary Aculeates

by

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It has for a very long time been the custom of observers to "put a cross" of straws over the entrance to a nest, so one could see whether the owner had been passing the entrance during the absence of the observer. It was mostly used in cases of nests in sand with a more or less horizontal surface. If the cross is undisturbed, we know that the wasp has not crossed it, but if it is disturbed, it does not tell how many times the wasp has been there. With wasps living in hollow tubes such as bamboos, the method is virtually worthless. During a recent investigation of *Trypargilum striatum* nesting in bamboo tubes, I developed a method which may be useful also in other cases. It is a burglar alarm based on the principle that a pulsed beam of invisible infrared light is directed towards a reflector from which it is bounced back to a sensor. As long as the sensor receives the beam, nothing happens; but if the beam is interrupted, an alarm is started. The type I used (Radio Shack 49-551, \$34.95) has a transmitter and sensor built into one unit. It is placed above the entrance to the tube, and the reflector-plate is placed 8-10 inches below it. The impulse to the alarm is

directed to an event recorder (Evans 1975, Ann. Ent. Soc. 68: 398-400).

Even if it cannot be excluded that a few records are caused by casual intruders, the method gives a clear picture of the beginning and the end of activity and of periods of maximal activity.



ENDANGERED SPHECIDAE, MUTILLIDAE AND VESPIDAE

by

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On January 6, 1989, the U.S. Fish and Wildlife Service published an extensive 'notice of review' on United States animal species and subspecies believed to be candidates for protection under provisions of the U.S. Endangered Species Act, to be extinct, or to be previously considered names that are now known to be taxonomically invalid or to represent taxa now thought to be in no danger of extinction (see Drewry in Recent Literature). The Services is seeking further information on these candidates or about other species that might be considered.

Twelve species of Sphecidae, one Mutillidae and two Vespidae are mentioned for the United States. All are listed as Category 2 candidates - species requiring more information before a decision can be made. These species are as follows:

Mutillidae

Myrmosula (Myrmosa) pacifica
(California)

Sphecidae

Deinomimesa hawaiiensis (Hawaii)
D. punae (Hawaii)
Ectemnius giffardi (Hawaii)
E. curtipes (Hawaii)
E. fulvicrus (Hawaii)
E. haleakalae (Hawaii)
E. bidecoratus (Hawaii)
Nesomimesa kauaiensis (Hawaii)
N. perkinsi (Hawaii)

N. sciopteryx (Hawaii)
Eucerceris ruficeps (California)
Philanthus nasalis (California)

Vespidae

Odynerus niihauensis (Hawaii)
O. soror (Hawaii)

Comments on these species should be addressed to: Regional Director, U.S. Fish and Wildlife Service (FWE-SE), Lloyd 500 Building, Suite 1692, 500 NE Multnomah Street, Portland, OR 97232. Copies of the notice may also be obtained at that address. Comments on species from other regions should be addressed to Director (FWE-SE), U.S. Fish and Wildlife Service, Washington, D.C. 20240.



SOCIAL WASP PREYING ON MOSQUITOES

Ron Ward of the Smithsonian Institution brought the following paper to our attention and we share it with readers of *Sphecos* - edit.

H. H. Stage reported in the June, 1948 issue of *Mosquito News* (8(2): 73) that he observed two adult anopheline mosquitoes being caught and devoured by *Polybia occidentalis parvula* (F.) inside a stable trap at the edge of the jungle near Moengo, Surinam. This was the only observation of such predation during two weeks of collecting.

Ron (heh, heh) suggests that this may be a new biocontrol procedure for malaria vectors.



COLLECTING REPORTS

Collecting Eusocial Wasps in Maracay, Venezuela

by

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& David C. Queller

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Maracay is a lovely city 455 meters high about an hour and a half (by tollway) west of Caracas. It is the location of Universidad Central de Venezuela, Facultad de Agronomía, and like any other agricultural university, has many hectares dedicated to crops, livestock, and wasps. The edge of campus is especially good for collecting because it follows uncut jungle of the Parque Nacional Henri Pittier where mountain ridges snake onto the Valencia plain.

We spent about 10 days in August, 1988 collecting social wasps on the campus and near the Hotel Maracay which also backs on the park. Our research was facilitated in every way by Jorge González, a graduate student at the university, and we are very grateful to him. We were also made to feel welcome by several professors on campus including Dr. Juan Jose Castillo, and Dr. Alberto Fernández, who is also director of the biological station at Rancho Grande in the cloud forest of Henri Pittier. On campus we found an abundance of *Parachartergus colobopterus*, *Polybia occidentalis*, *Polistes versicolor*, and *Polistes erythrocephalus*, and a few colonies of *Polybia emaciata*, *Polybia ignobilis*, *Synoecca surinamensis*, *Brachygastra lecheguana*, and unidentified species of *Michocytarus* and *Metapolybia*. All colonies we examined were rearing brood at this time of year.

The Hotel Maracay is a grand old hotel right against the mountains. This hotel is perfect for research since it is quiet and each room has a long formica counter with a florescent light over its length - perfect for sorting specimens and the price was under \$15/night. Behind the hotel were several mountain bowls with savannah on the sides and ridges, and jungle in the small valleys. We hiked up through the savannah and

saw colonies of *Polybia sericea*, *Brachygastra lecheguana*, and *Polybia occidentalis*, though not in great abundance. In the mango trees on the grounds of the hotel we found a number of colonies of *Polybia emaciata*. Several of these were collected for us by a garage attendant who climbed high into the trees, covered the entrance of the mud nest with his thumb, plucked the nest and brought it down.

A permit from the national park service, INPARQUES, is required for collecting in any national park. Duplicates of any insects collected in Venezuela must be deposited in the university collection at Maracay. We have deposited vouchers of the species we collected there, and in the Museum of Comparative Zoology, Harvard University.

Venezuela is a delightful country for entomological research since its tropical habitats are highly varied and often accessible, prices are low to North Americans at current exchange rates, roads are good, and there are many possibilities for collaborative research with the scholars at Venezuelan universities. In fact we plan to return in December, and as soon as possible after that.

Collecting Social Wasps in Yucatán, México

by

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& Joan S. Strassmann

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In December, 1987, we visited the Mayan sites of Chichén Itzá, Cobá, and Uxmal and found them to be excellent for social wasps because of the combination of thatch, protected vegetation, and water sources at the hotels. In thatch we found colonies of *Mischocyttarus immarginatus*, *Mischocyttarus basimacula*, *Polybia occidentalis*, and *Polistes stabilinus*. We also found a number of *Polistes instabilis* females motionless deep in the thatch. Their abandoned nests hung over a small pool a few meters away. *Mischocyttarus immarginatus* was not associated with *Polybia occidentalis*. In trees and bushes in

the area we found *Parachartergus apicalis*, *Polybia rejecta*, and one large colony in a hollow limb of *Stelopolybia* [now *Agelaia* - edit.] *areata*. (We thank Jim Carpenter for identifying these specimens.) *Parachartergus apicalis* nests could be seen along the highway from Chichén Itzá to Valladolid every few kilometers. The owner of the restaurant, El Bocadito, at Cobá assured us that there were a number of other social wasp species in the area that could be collected by visiting private ranches, but we did not have the time to do so.

Southeast Asia

by

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The Australasian region, with all its fascinating islands, its bewildering variety of flora and fauna, its cultural richness, its culinary delights, and its charming people, is certainly one of the most appealing areas of the world. The famous 19th century collector A. R. Wallace had to spend several years in what used to be the Dutch East Indies, in order to visit the more important areas of endemism, enduring all the hardships of lengthy traveling by ship. In present day Indonesia four or five airlines compete, and even quite remote places have their own airfield with scheduled flights. A great innovation for modern Wallaces is the "visit Indonesia Airpass" of Garuda, which allows you to fly to and fro on Garuda's flights, during 3, 6 or 9 weeks.

A certain disadvantage of Indonesia is its wealth of bureaucracy and corruption. In principle, everybody who wants to do anything scientific in the country needs a licence from the government, which is not easily obtainable. You must arrange it in advance, you need local support from a university or institution, etc. It is much easier to go as a tourist. This however limits your stay in the country to a maximum of two months. You still need a tourist licence to visit any of the national parks; this one is more readily available but it may still mean hanging around in a forestry office for many hours. Also, you need a licence to visit

any places in Irian Jaya and East Timor.

A grant from the Uyttenboogaart-Eliassen Stichting enabled me to make a collecting trip to Indonesia. The main aim was to collect *Liris* and other Larrines.

Starting in the capital Jakarta, the first stop on my Airpass was Ambon in the South Moluccas. This tiny island is completely deforested, but neighboring Ceram is quite nice. I stayed in the small village of Hatumete, where I was the guest of the local radja. The virgin forest was not easy to reach: an entire day walking uphill, they told me, so I collected in the remnant forest and secondary vegetation around the village for a few days, which yielded many interesting things as well.

Next island on the list was New Guinea, the western half of which, Irian Jaya, has opened up to tourists only recently. Still, you have to spend several hours at the police station in Jayapura to get your "suret jalan", traveling permission: they want to know exactly where you wish to go, when, how long, and why. When you fly over Irian Jaya, you can see that it is still largely covered with rain forests and even in the immediate vicinity of Jayapura, there is still a lot left. Apart from Jayapura, I visited Merauke, Sorong and Biak. Sorong, on the tip of the Birds Head is a bit spoiled, a large oil terminal and lots of transmigration projects nearby, but Merauke, in the extreme south, was the best place of my entire trip. It is much drier than the north and the forest is much more open. Near the town are old dunes, which yielded lots of aculeates, notably *Ammophila*, *Bembix* and *Bembecinus*. For forest, you have to go about 200 km N along the newly built Trans-Irian Highway (it is going to run all the way to Jayapura, but some bridges had disappeared already in the part I saw, and many were on the verge of collapsing). The forest is really beautiful, with casuarines and kangaroos among the wildlife. Aculeates were plentiful, including many *Liris*, *Pison*, *Isodontia* and *Dicranorhina*.

Next area of endemism to be visited was Sulewesi. The national park Tangkoko, not far from Manado in the North, was the best place I saw on the island. It consists of unspoiled rain

forest on rather dry volcanic soil. The trees are enormous, but because of periodic fires, the forest is not dense and rather light. Plenty of Hymenoptera, including many *Sphex*, *Sceliphron rufopictum*, and a lot of *Liris*.

Last island was Sumatra. This huge island is now largely deforested, and even what is left in the reserves is severely threatened (corrupt forestry officials boost their meager income by allowing poaching and illegal logging). It is not a very pleasant island either, as the people are the most annoying and cheating in the country and the roads and buses are quite bad. It is heavily Muslim, and when you go there in Ramadan, as I did, you get nothing to eat during day time. I stayed in Bukittinggi for a week, but it was too rainy and cold to collect much. Fort de Cock, type locality of many sphecids described by Maidl is now a tourist attraction devoid of wasps. Further north in Aceh province, is the large reserve Gunung Leuser, with most of the remaining Sumatran rhino's, and much other wildlife, particularly mosquitos and leeches. The forest is beautiful, but very dark and wet. Sphecids were not abundant, only some crabronins and *Carinostigmus*. Vespids were more numerous, in particular stenogastrines and *Polybioides*.

By then, the two months visa for Indonesia was running out, so I hopped over the Strait of Malacca to Penang in Malaysia and traveled further to Thailand. I went to the reserve Khao Chong in the South for a few days. I had visited this park two years ago in August, and collected many interesting things then. Apparently the aculeates are seasonal here, for I found a fairly different array of them this time in May. The spectacular large green *Chlorion lobatum* absent the first time, was rather common now. Two weeks of escapism on Ko Samui (beaches, coconut palms, blue sky) and a few days Bangkok (interesting night scene and marvelous temples) completed my journey.

Apart from the sphecids, which are in my collection for the time being, the collected material has been deposited in the Rijksmuseum van Natuurlijke Historie at Leiden.

Australia and the Outback by

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Australia! Wonderful place! I had the pleasure of spending two months (Nov. & Dec.) there and I'm ready to go back! Started in Canberra, ACT (Thanks to Bob & Wendy Taylor for being such splendid host & hostess!) and drove around the entire country - a bit over 32,000 kilometers! Quite a trip, but with so much driving (in 58 days), not a whole lot of time for collecting! That was just as well, because in the south, weather was unseasonably cool & rainy, a definite damper on collecting. Even so, I did collect a lot of material in all groups of aculeates. All the larger stuff was field pinned and now I'm processing the little stuff (sure got a bunch of *Perdita*-size bees!). More importantly, I saw the country and found areas I hope most fervently to get back to for extended periods of intensive collecting.

There's nothing to equal the thrill of seeing - and collecting your first *Diamma* or *Abispa* or *Thyreus* or ----, I heartily recommend it. I was startled to discover that the dreaded bull-dog ants (*Myrmecia* spp.) are pussy-cats! The sting (I got a few) is no worse than that of *Pogonomyrmex* and doesn't last as long.

Some notes on travel there:

(1) Driving on the wrong side of the road isn't so terrifying and becomes "normal" in a couple of weeks (but, watch out for right-turns in Melbourne. Most peculiar, that). The road conditions vary from good to poor; there is no such thing as an all-weather highway there and flooding is a normal hazard (those "floodway" signs mean business!).

(2) Gasoline (petrol) is expensive - well over \$2.00 US/gal. in many areas.

(3) Motels are about the same in price as here - \$35.00-65.00 per night. Sometimes you can get rooms in the local pubs for a better rate. Best bet, though, are the caravan parks. They often have on-site units available for \$20.00-30.00/nite. Of course, you share bath/shower

facilities, but they do have laundries.

(4) Food tends to be expensive - as well as monotonous - in the roadhouses and varies from inedible to fair. Better to buy groceries in a market and snack while driving.

(5) If you're addicted to tobacco, as I am, be warned - it's expensive! cigarettes up to \$2.50/pack. For pipe smokers (me) it's even more grim. There may be a true tobacco shop somewhere in Australia but I didn't find it. The commercial stuff is in 1 oz packets (when you can find it) and barely palatable. And expensive. You are allowed to bring into the country 1 carton of cigarettes or 3 lbs. of pipe tobacco. (As an aside, I would note that Australian Customs did not examine my incoming luggage).

(6) In Western Australia and Northern Territory, watch out for road trains. These terrors of the road (driven by Rambo clones) have 52 wheels, are up to 50 meters long, and take up two thirds of a road that is often only one and a half vehicles wide, travel at 110 km/hr and give way for nothing! It's quite a thrill to meet one on a narrow road, at sundown, in a driving rain. Not to worry. The road shoulders are wide and secure. Usually.

(7) Kangaroos are common. They are a very real driving hazard at late afternoon and early evening! Best not to drive any later than you must. No, I didn't hit any 'roos, but came close a couple of times.

(8) A good general rule: roads that are indicated for 4-wheel drive only are generally properly marked.

(9) Carry extra petrol and water (5 gals. each). You may need them, especially if you travel much off the main road. The water is a good idea, too, because in some areas the local stuff is not the most palatable.

(10) Aussie beer is much made of. If you enjoy the junk brewed in the U.S., you'll love the Aussie stuff (which has higher alcohol content). Best of the lot, in my opinion, was Victoria Bitter (VB), followed by XXXX. Fosters is the downunder Coors; best to save a step in the process and pour it directly into the toilet.

(11) The best collecting is in the National Parks. Permits are legally required, but in many parks the rangers don't care. Queensland is the big

exception. Up there, they are very sensitive, so be careful. Export permits are required in order to-legally-get your material out; the folks at Canberra were very helpful.

(12) I'm ready to go back. Right now.

Costa Rica by Arnold Menke

December 21 I left the frigid DC climate and headed for Costa Rica where I joined Frank Parker for two and a half weeks of R&R. After enduring two hours in the usual horrendous long lines at LACSA's counter in Miami, I finally was on a plane headed for San Jose. As it turned out, the flight was oversold, and LACSA added a second plane; as a consequence, I arrived in San Jose about an hour late. Frank, who works out of the American Embassy, flashed his embassy card, said a few words in Spanish to the aduana, and got me out of Costa Rican customs in a hurry. We then retired to Frank's hacienda in Escazu, a small town a few kilometers west of San Jose. His house is situated on a hillside that affords fine evening views of the lights of San Jose and all the other towns in the valley. By Costa Rican standards, his home is palatial. Frank has a live in housekeeper, Susana, who is one heck of a fine cook. He also has a fine pool table on the veranda where we continually challenged each other to see who could scratch the most.

The next morning we got our gear together, picked some tangerines and oranges from the trees in Frank's backyard, and headed for the Atlantic coast over the new superhighway to Puerto Limon. After reaching Limon we headed south along the coast till we reached the sleepy little town of Cahuita, famous for its huge offshore coral reefs and sparkling clear water. We stayed at the Surf Side Cabins right on the beach in a secluded area at the north end of town. At slightly more than \$10 per day for two it is to be highly recommended by anyone venturing into this part of the country.

Cahuita consists of several dirt roads, three restaurants of varying quality (we much preferred Restaurant

Edith at the northeast corner of town near our cabin) and a couple of general stores. Hotel Cahuita (and restaurant) at the south end of town was the place frequented by most of the gringos that we met, but we didn't care much for their service or atmosphere.

After setting out my two malaise traps in the backyard of the owner of our cabin, we set out for a dirt road that led into hilly rain forest country about 5 miles south of town. This was the dry season and collecting was on the slow side. Orchid bees came in to cineole and eugenol and as usual were fun to collect until they became old hat. The next day we tried a different road only two miles south of town and had much better luck: lots of "bycids" and other beetles on some logs, more variety of orchid bees, *Ampulex*, "airplane bugs" (Derbidae - those crazy fulgoroids that line up on plant stems like a formation of tiny jet fighters and split the second they are disturbed), and other fun creatures. As you can tell, I was simply collecting fun stuff - I didn't care if I got any wasps or not - after all this was my vacation and I paid for it.

The *Ampulex* were males and they were attracted to one particular tree of small trunk diameter (circa 2"). Collecting them with a net was not practical mainly because the tree was on a steep downslope from the road that precluded easy access without breaking my neck. So . . . it was time to try out Colin Vardy's Chloroform Gun (see *Sphecos* 17:17). I loaded up my syringe with the magic fluid and poised at the road edge, ready for the next *Ampulex*. I discovered that some light reading material would have been nice to have had while waiting for another "greenie" to make an appearance! Oh well. Time passed and finally in flew another *Ampulex*. Zap! A direct hit, he was stunned, I hit him again and he fell into my net. What a thrill! Time passed and number two came in, zap, another direct hit and into the waiting net. However, as others came by my accuracy fell off and I discovered that only direct hits resulted in capture. A near miss did nothing to the *Ampulex* except arouse suspicion that something sinister was about to happen and cause him to split. Obviously, my syringe had too fine a needle. On this point Colin is certainly

correct. Use a LARGE needle, maybe something like a vet might use on an elephant. Then perhaps the ensuing spray would be wide enough to dampen the spirits of the quarry sufficiently to retard departure.

We had Christmas eve and Christmas dinners at Restaurant Edith, a small open air place with about 6 or 8 crowded tables. Memorable to say the least.

After 4 days we left for San Jose, stopping enroute in Puerto Limon to get a brief look at the railroad (narrow gauge, diesel), and also to do some collecting in a recently cut forest area just west of Guapiles (Rio Dantas). The latter area was fun. Pulling bark from dead logs looking for giant Passalidae, scorpions and other creatures, and later collecting those large fulgorids that have long waxy tails hanging down from the end of the abdomen. At the base of the tree upon which those fulgorids were feeding was situated the nest entrance of *Paraponera clavata* (F.), the largest New World ant, and one of the worst stingers known to man. Fortunately, Frank spotted them pouring out of the hole before they spotted him. We had fun picking them up with my foot long tweezers - boy are those ants strong!

We spent two days at Frank's hacienda before leaving on another adventure. One of those two days we simply hiked up the mountain behind his house collecting whatever (lots of nifty butterflies). The second day we explored another mountain area just south of the town of Santa Ana (a few kilometers west of Escazu). Here, on a pile of sand left by a developer, we collected gorytines flying in with their homopterous prey and a few associated mutillids nosing about looking for holes. I captured a specimen of *Astata centralis* Parker, which, according to Frank, is the fourth known example! Ta, ta, Frank. The most fun things taken that day were some very large acrocerid flies (*Lasia coleii* Aldrich, det. Norm Woodley) hovering in front of flowers. Because of their coppery green color, these flies looked like giant chrysidids. Frank got two, I got 10. Ta ta, Frank. Previously this creature was known only by the holotype! I also captured a number of skipper butterflies on agave that look

like the genus *Megathymis* or something near it. Every plant had one or more of them and they just sat there while I netted them.

Our second trip was to the Pacific coast. We took the road to San Mateo and then south to Tarcoles right on the coast. Collecting in the forest back from the coast at Tarcoles proved disappointing, as did efforts elsewhere along the Pacific coast as we drove south to Quepos. Near Esterillos is a great looking beach hotel named Hotel Delphin. It was full so we didn't get to stay there, but it looked great. During the holiday season the Ticos head for the beaches and generally accommodations are hard to come by on the spur of the moment as we found out on this particular trip. We had intended to spend time at the national park just south of Quepos, but the place was jammed with Ticos and we decided to head for more sparsely populated terrain. Between Quepos and Dominical the former banana plantations have given way to oil palm plantations. We attempted collecting here and there but got little for our efforts. The best collecting was at the end of the day along the river at Dominical. Here we got large fulgorids on tree trunks, some sphecids on the sand bars in the river bottom (*Bembecinus*, *Oxybelus*, *Microbembex*), but in general it was slow. We decided to head inland to the town of San Isidro del General for the night.

About 3 miles south of San Isidro on the Pan American Highway you come to the Hotel del Sur, a motel really, that is superb. For 10 dollars a night, Frank and I had ourselves a very nice room with bath and shower. There was a pool table in the lobby and Frank and I spent some hours testing each others skills with a que stick. The hotel's restaurant served good food at reasonable prices.

New year's eve the hotel put on a big party and Frank and I attended, apparently the only gringos. Live music, singing, dancing, noise makers, hats, confetti - what a blast! A trail of confetti lead to our room, and then as I sat on the bed, Frank showered me with more confetti! I'll get you yet Frank!

We spent three days at the hotel. The first day we drove south about 6 miles to a stream bottom where we got

a variety of small wasps and bees (*Solierella*, a micro-*Tachytes*, *Bembecinus*, *Liris*, etc.), the kind of collecting that Frank loves. I preferred forest habitat - it was cooler, more interesting, and more exotic creatures. So the second day Frank went to the river, I went to the forest. In the latter area I collected helicopters (those large damselflies that breed in bromeliads - *Pseudostigmatidae*, *Mecistogaster* sp.), *Podium*, *Spheg*, some neat weevils, assorted butterflies, and the like. Under the bark of dead trees one often finds a giant earwig with orange spots on the hemilytra that can draw blood with its pincers - just ask Frank. We got them here and at other places in our travels.

January 2 we headed back to San Jose. Our route was north along the Pan American Highway. This road climbs steadily from San Isidro passing through different life zones until you reach the Cerro de la Muerte at over 10,000 feet. It is hard to believe you are in the tropics. In some places the terrain has an alpine quality to it. It was cloudy (or foggy) much of the time and cool, and I imagine that collecting here would be difficult at any time, but I also suppose that whatever you got would be different. We collected at several places on the way up to the Muerte (5000-7000') and at one spot we took quite a few females of *Podalonia communis* "ssp. *atriceps*". No males were seen unfortunately. The females were flying slowly close to the ground right at the edge of the road - the cool weather seemingly slowing them down. We also collected several different bumblebees, representing, I suppose, several new subgenera.

After we got back to the hacienda, Frank had to go back to his screw worms. He generously allowed me use of his Toyota truck and off I went to the Santa Ana area discussed earlier. Frank chided me, saying that all I wanted to do was to clean out the rest of the acrocerids. Nothing I could say would dissuade him. Well I showed him, I only collected 12 more. The Smithsonian Collection previously only had the type of this species, now it has 22. Actually I was really after *Astata centralis*, but I apparently had collected the last one known to mankind earlier on. I did get more

gorytins at the sand pile.

The next day Frank took me to his screw worm lab near Tres Rios in Cartago Province (east of San Jose). There he showed me how, after a few days aging, a little old cow liver would really attract screw worm adults. No accounting for a fly's tastes! Then I got into Frank's truck and drove off to Volcan Irazu, one of the volcanoes that ring the north side of the valley in which San Jose is located. The drive to the top is like going through parts of Switzerland - many neat little farms, a few small towns, all very picturesque. As I ascended it got cloudier and cloudier, and by the time I reached the summit at 3400m I couldn't see squat due to the fog and rain. I peered down into the crater and vaguely saw a green lake at the bottom. The weather prompted me to return to Frank's lab pronto. There I collected along a railroad right-of-way with minimal success - it was rainy there too. Got another new subgenus of *Bombus*, one wheelbug, and assorted other Insecta. The next day from Frank's house I could see that the volcano was cloud free! I had simply chosen the wrong day to visit it. I collected in weed lots near Frank's home that day, taking various aculeates including *Ammophila centralis*, *Isodontia*, *Cerceris*, *Omicron*, etc. The next day I was on my way home.

Like most Latin American countries, Costa Rica is losing its forests at an alarming rate. Costa Rica is a small country, but it has established many national parks that will fortunately preserve some big hunks of forest - but will they be enough? Although there is lots of unprotected forest left in Costa Rica, farms and pasture dominate the landscape, and it is only a matter of time before most of what is left is cut down.



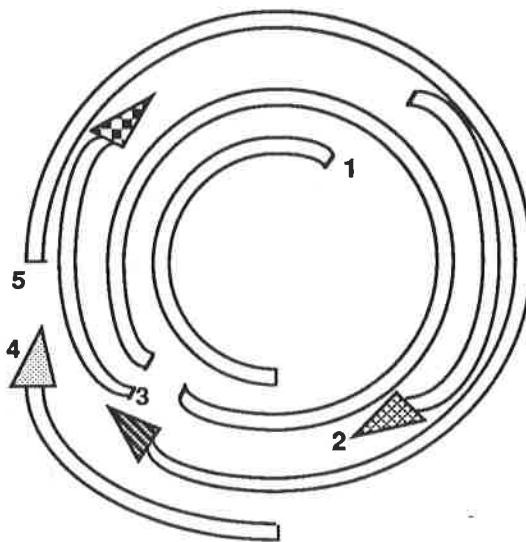
SPHECOS 17 ERRATA

Courtesy of

James "YoYo" Carpenter

Nomenclature is **binominal**, not "binomial" (p. 7-8).

Who the hell is J. F. Carpenter (p. 34)? My evil twin? Perhaps he's responsible for the diatribes that have led to the FFUCC, although if there's money in said group, I demand a piece of the action. My paper is not on "Stenogasterinae" (p. 34). *Stenogastrinae* is correct. (Sorry Jimbo - edit.)



In his old age, Carpenter abandoned linear thought and developed the new and more flexible method of Cursive Cladistics.

ERRATA IN SPHECID WASPS OF THE WORLD

- p. 179, RC, L 18-19: transfer *punicus* Gribodo to synonymy with *oraniensis* (L 14) and delete dagger symbol.
- p. 179, RC, L 25 & 35: change "India" to Pakistan.
- p. 185, RC, L 36: *exul* Turner, 1907; Australia is correct.
- p. 212, RC, insert after L 4: *centralis* Parker, 1964; Honduras, Costa Rica.
- p. 212, RC, L 15 from bottom: change "w. India" to Pakistan.
- p. 212, RC, insert after L 19: *evansi* Parker, 1964; Mexico.
- p. 212, RC, L 25: delete entry (properly

placed is *Palarus* on page 290).

- p. 213, LC, insert after L 34: *stangei* Parker, 1964; Mexico.
- p. 213, LC, insert after L 42: *westcoathi* Parker, 1964, Mexico to Venezuela.
- p. 266, RC, L 33: Mali is correct, not Niger.
- p. 266, RC, L 5 from bottom: Mali is correct, not Senegal.
- p. 273, LC, L 30: *tadzhikus* is correct.
- p. 275, LC, L 2: delete entry (correctly placed on page 273).
- p. 275, LC, L 16 from bottom: delete entire entry (it is properly listed in *Tachytes* on page 266.)
- p. 291, LC, L 20 from bottom: Pakistan is correct.
- p. 319, LC, L 27: transfer *brunnescens* to *mochii* (p. 318, RC) as a synonym.
- p. 335, RC, L 4 from bottom: *fraterculus* is correct (noun).
- p. 336, LC, L 25 from bottom: *minicum* is correct.
- p. 336, RC, L 14 from bottom: *suspica* is a synonym of *fasciatum* on p. 335.
- p. 352, LC, L 8: 1967; Paraguay is correct for *duchei*.
- p. 368, LC, L 9 from bottom: correct entry is: *ssp. banksi* (Ashmead), 1905 (*Notoglossa*); Philippines.
- p. 369, LC, L 7 from bottom: *pyrus* is correct.
- p. 370, LC, L 6 from bottom: *zavattarii* is correct.
- p. 382: *Entomognathus* is feminine. Change -us endings to -a for all species.
- p. 368, RC, L 3 from bottom: *bistillatus* was proposed as an aberration (infrasubspecific) and is not available under the Code (Art. 1(b)5 & 16). Delete entry.
- p. 384, RC, L11 from bottom: change "India" to Pakistan.
- p. 439, RC, L 4 from bottom: 1956 is correct, not 1955.
- p. 469, RC, L 5 from bottom: after Rohwer, 1921, add: nec Turner, 1915.
- p. 469, LC, L 12: 1877 is correct, not 1879.
- p. 470, RC, L 13: *freyigessneri* is correct.
- p. 473, LC, L 8 from bottom: *aurantiacus* is correct.
- p. 474, RC, L 7: Australia: Victoria is correct.

p. 624, RC, L 27 from bottom: 1956 is correct, not 1955. Williams paper was mailed Feb. 15, 1956.



ANNOUNCEMENTS

SPHECOS 10th Anniversary

The next issue of this rag should appear in October, and it will mark 10 years of **Sphecoc**s! Lets make number 19 a memorable one. Send in something special. Maybe we will go through all the past issues and pick out a few funny items and stick them into #19 - Edit.

Entomology Resource Guide

Publication for Sale: 75 page Y.E.S. International Entomology Resource Guide (Second Edition); 450 businesses and organizations offering entomology equipment, supplies, services, preserved specimens, live arthropods, books and publications, audio-visuals, educational materials, gift and novelty items, insect zoos and butterfly houses, and entomological organizations. Send US \$7.50 to the Young Entomologists' Society, Dept. of Entomology, Michigan State Univ., East Lansing, MI 48824-1115 USA.

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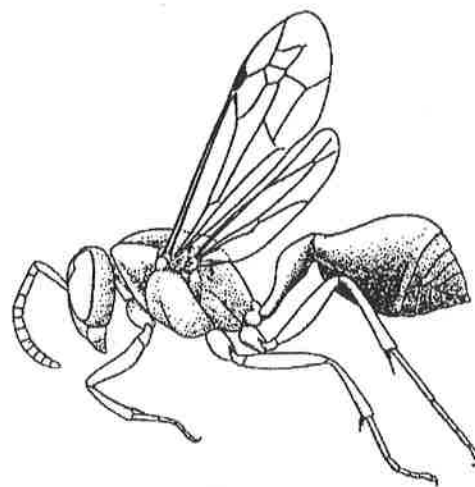
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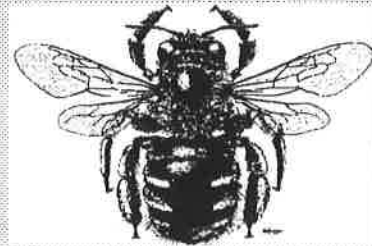
FAVOR DE COPIAR Y CIRCULAR

EL PROGRAMA COOPERATIVO SOBRE LA APIFAUNA MEXICANA (PCAM) anuncia su taller

TAXONOMIA E HISTORIA NATURAL DE LAS ABEJAS DE MEXICO*

con ponencias,
prácticas de museo,
trabajos de campo
8 profesores del extranjero

- cupo • 10 alumnos
- costo • transporte y viáticos pagados
- fechas • del 9 al 23 julio de 1989
- lugar • Estación Biología Chamela (UNAM), Jalisco,
y con recorridos extensos por provincia



marco y objetivo

El grupo de las abejas es de suma importancia por su papel en la polinización de la flora silvestre, tanto como de diversos cultivos, y es de mucho interés por la diversidad en su especialización alimenticia, ciclo de vida y comportamiento social. Si bien se estima la presencia en México de alrededor de 2000 especies entre las 8 familias, faltan especialistas nacionales. Intentamos estimular y formar personal para investigación especializada en:

temas

- Taxonomía
- Historia de vida
- Biogeografía
- Morfología
- Aparamiento
- Anidación
- Forrajeo
- Polinización

*se excluyen las razas de
Apis mellifera
curso en inglés

requisitos: entender bien y leer inglés; pasante en biología (o más avanzado); dedicación por seguir alguna carrera que involucre investigación relacionada con las abejas (no *Apis*), por ej. en la taxonomía, ecología, botánica, etc.

solicitudes: 1) carta de solicitud mostrando la base de su interés, la proyección de su carrera, y posibles líneas de investigación sobre el tema; 2) cartas (1-2) de recomendación detallada de maestros o investigadores;

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fecha límite para recibir solicitudes: 15 de abril
organizadores: Drs. R.J. McGinley y C.D. Michener
patrocinio: Smithsonian Institution y la U.N.A.M.



**TROISIEME CONFERENCE INTERNATIONALE
DES ENTOMOLOGISTES
D'EXPRESSION FRANCAISE**

Gembloux, 9 - 14 juillet 1990

Cette conférence - ouverte à tous les entomologistes, arachnologues, acarologues, professionnels ou amateurs de toutes disciplines fondamentales ou appliquées - se tiendra à Gembloux (Belgique) à la Faculté des Sciences agronomiques de l'Etat. Elle donnera lieu à des conférences plénières, communications, tableaux de démonstrations ("posters"), ateliers. Elle comprendra aussi des sessions spéciales dans d'autres villes de Belgique et sera suivie d'excursions.

Les conférences, les différentes communications et ateliers devront s'inspirer du thème général de la conférence:

Méthodes et responsabilités des entomologistes d'aujourd'hui

Les communications s'inscriront dans le cadre de sections qui ont été définies par le Comité organisateur. Elles ne sont pas encore définitives. En voici la liste provisoire:

1. Entomologie culturelle
2. Entomologie médicale, vétérinaire et médico-légale
3. Insectes, amateurs et grand public
4. Entomologie agricole
5. Entomologie agricole dans les pays en voie de développement
6. Rôle des arthropodes dans la qualité et la fertilité des sols
7. Insectes sociaux
8. Médiateurs chimiques
9. Entomologie des milieux forestiers
10. Tendances actuelles de la systématique
11. Zoogéographie
12. Systèmes tégumentaires (cuticule, mue et métamorphoses,...)

La langue officielle de la conférence (exposés thématiques, communications et tableaux de démonstrations) sera le français. Cependant les participants auront l'entière liberté de s'exprimer dans la langue de leur choix au cours des discussions qui suivront les exposés ex-cathedra et lors des présentations et discussions des affiches.

Si vous souhaitez participer ou assister aux travaux de l'une ou l'autre des sessions de cette conférence, veuillez rapidement prendre contact avec le Secrétaire général:

Monsieur Charles VERSTRAETEN
Zoologie générale et appliquée
Faculté des Sciences agronomiques de l'Etat
B - 5800 Gembloux (Belgique).

Nous vous demandons de signaler vos intentions ou votre pré-inscription avant le 1er mai 1989.

Dans ce cas, la prochaine circulaire d'informations comprenant le formulaire d'inscription vous sera envoyée en juillet 1989.

RECENT LITERATURE

- (Notable items: Argaman, 1988; Danforth & Michener, 1988; Day, 1988; Johnson, 1988; Kukuk, *et al.*, 1989; Michener & Grimaldi, 1988)
- Alcock, J. and M. Carey
1988. Hiltopping behaviour and mating success of the tarantula hawk wasp, *Hemipepsis ustulata* (Hymenoptera: Pompilidae), at a high elevation peak. *J. Nat. Hist.* 22:1173-1178.
- Andersen, M. and P. Nielsen
1988. *Gonatopus brooksi* Olmi, 1984 found in Greenland (Hymenoptera, Dryinidae). *Ent. Meddr.* 55:21-22.
- Antropov, A.V.
1987. [On the fauna of the sphecids wasp genus *Trypoxylon* Latreille (Hymenoptera, Sphecidae) of the eastern Palearctic], p. 57-61 in: P. A. Lehr and N. A. Storoshev (edit.), [New data on insect systematics of the Far East]. Biological Pedological Inst., Far East Section, Acad. Sci. (in Russian)
- Archer, M. E.
1982. The mason wasps (Hymenoptera: Eumenidae) of Yorkshire. *Naturalist* 107:5-13.
1985. The wasps and bees (Hymenoptera: Aculeata) of Pomocalli near Leeds: the first 27 visits. *Naturalist* 110:49-51.
1988. The Aculeate wasps and bees (Hymenoptera: Aculeata) of my local patch: Strensall Common, the first 70 visits. *Naturalist* 110:49-51.
1988. The aculeate wasp and bee assemblage (Hymenoptera: Aculeata) of a woodland: Bernwood Forest in the English Midlands. *Entomologist* 107:24-33.
- Argaman, Q.
1988. A new subfamily of Bethyridae allied to *Pristocerinae*. *Boll. Soc. Ent. Ital.*, Genova, 120:139-152.
1988. Generic synopsis of *Sclerogibbidae* (Hymenoptera). *Ann. Hist.-Nat. Mus. Nat. Hung.* 80:177-187.
- Asis, J. D., S. F. Gayubo and J. Tormos
1988. Notes on the preimaginal states of Iberian Sphecidae III. Description of larvae of *Stizus perrisii ibericus* Beaumont, 1962 (Hymenoptera). *Ann. Soc. Ent. France (N.S.)* 24:289-293.
- Beani, L. and S. Turillazzi
1988. Alternative mating tactics in males of *Polistes dominulus* (Hymenoptera: Vespidae). *Behav. Ecol. Sociobiol.* 22:257-264.
1988. An experiment on the relationship between spatial behaviour and mating success in the male *Polistes gallicus* (L.) (Hymenoptera Vespidae). *Monitore Zool. Ital. (N.S.)* 22:323-330.
- Bitsch, J.
1988. Captures de *Chalybion femoratum* dans le Midi de la France et observation d'un nid. *Bull. Soc. Ent. France* 93:43-51.
- Bohart, R. M. and A. Willink
1989. The genus *Microbembex* in Argentina (Hymenoptera: Sphecidae). *Trans. Amer. Ent. Soc.* 114:295-310.
- Bourke, A. F. G.
1988. Worker reproduction in the higher eusocial Hymenoptera. *Quart. Rev. Biol.* 63:291-311.
- Brown, T. M. and B. C. Ratcliffe
1988. The origin of *Chubutolithes ihering*, ichnofossils from the Eocene and Oligocene of Chubut Province, Argentina. *J. Paleont.* 62:163-167. (fossil sphecids nests)
- Budrys, E. R.
1987. [Sphecids wasps of the genera *Stigmus* Panzer and *Carinostigmus* Tsuneki (Hymenoptera, Sphecidae) of the Soviet Far East], p. 49-56 in: P. A. Lehr and N. A. Storoshev (edit.), [New data on insect systematics of the Far East]. Biological Pedological Inst., Far East Section, Acad. Sci. (in Russian)
1988. [New and little-known species of digging wasps of the tribe Psenini (Hymenoptera, Sphecidae).] *Horae Soc. Ent. Unionis Sov.* 70:101-116. (in Russian)
- Bunn, D. S.
1988. Observations on the foraging habits of the hornet *Vespa crabro* L. (Hym., Vespidae). *Ent. Mon. Mag.* 124:187-193.
- Carpenter, J. M., and J. W. Wenzel
1988. A new species and nest type of *Mischocyttarus* from Costa Rica (Hymenoptera: Vespidae; Polistinae), with descriptions of nests of three related species. *Psyche* 95:89-99.
- Cervo, R. and S. Turillazzi
1987. Experiments on recognition of the nest and young in *Polistes gallicus* (Hymenoptera, Vespidae). *Ecol. Persp. Soc. Presoc. Arth.* (36):33-34.
- Chakrabarti, S.
1987. Comportement de nidification de *Chalybion* (*Ch.*) *bengalense* (Dahl) (Hymenoptera: Sphecidae), p. 115-122 in: Act. Cong. Jean-Henri Fabre, Ann. Jubilé (1910-1985). Paris.
- Cooper, M.
1988. New county records of aculeate wasps (Hym.: Sphecidae and Chrysididae). *Ent. Mon. Mag.* 124:206.
- Colomo de Correa, M. V.
1988. Revision de las avispa Argentinas del genero *Tachypompilus* Ashmead (Hymenoptera: Pompilidae). *Rev. Soc. Ent. Arg.* 44:201-237.
- Danforth, B. N. and C. D. Michener
1988. Wing folding in the Hymenoptera. *Ann. Ent. Soc. Amer.* 81:342-349.
- Day, M. C.
1988. Spider wasps, Hymenoptera: Pompilidae. Handbook for the Identification of British Insects, 6(4):1-60.
- Delfino, G., C. Calloni and S. Turillazzi
1987. Sternal glands in males of *Polistes dominulus* (Christ): light and electron microscope findings. *Ecol. Persp. Soc. Presoc. Arth.* (36):55-57.
- Delfino, G., S. Turillazzi and C. Calloni
1988. A light and electron microscope study on the Dufour's gland in *Parischnogaster* (Hymenoptera: Stenogasterinae). *Z. Mikrosk.-Anat. Forsch.* 102:627-644.

- Drewry, G. (edit.)
1989. Endangered and threatened wildlife and plants; animal notice of review. Department of the Interior, Fish and Wildlife Service. 50 CFR Part 17. Fed. Reg. 54:554-579.
- Dode, M.
1988. Nota sobre el *Dolichurus laevis* Smith en el Museo Británico. Rev. Soc. Ent. Argentina 44:442.
- Dorow, W.
1988. Die größte mitteleuropäische Eumenidae, *Delta unguiculatus* (Vill. 1789), neu für Hessen. (Hymenoptera: Eumenidae). Mitt. Int. Ent. Ver. 13:25-27.
- Eighme, L. E.
1989. Revision of *Diodontus* (Hymenoptera: Sphecidae) in America north of Mexico. Ann. Ent. Soc. Amer. 82:14-28.
- Erlandsson, S.
1988. The distribution of the hornet (*Vespa c. crabro* L.) in northwestern Europe. Ent. Tidskr. 109:155-159.
- Etcheverry C., M.
1985. Los índices de la Revista Chilena de Historia Natural. Rev. Chil. Hist. Nat. 58:187-237.
1988. Carlos E. Porter, la Academia Chilena de Ciencias Naturales y los Anales de la Academia Chilena de Ciencias Naturales. Rev. Chil. Hist. Nat. 61:89-112.
- Evans, H. E.
1988. Further studies on the systematics and nesting behavior of eastern Australian *Cerceris* wasps (Hymenoptera: Sphecidae). Trans. Amer. Ent. Soc. 114:1-13.
- Felton, J. C.
1987. A new prey record for the solitary wasp *Gorytes laticinctus* (Lepeletier) (Hymenoptera: Sphecidae). Ent. Ber. 47:89-90.
1987. The genus *Nitela* Latreille (Hym., Sphecidae) in southern England. Ent. Mon. Mag. 123:235-238.
1988. The genus *Trypoxylon* Latreille (Hym., Sphecidae) in Kent, with a first British record for *T. minus* de Beaumont. Ent. Mon. Mag. 124:221-224.
- Field, J. P. and W. A. Foster
1988. The bees and wasps of Scolt Head Island National Nature Reserve, Norfolk. Brit. J. Ent. Nat. Hist. 1:79-83.
- Finnamore, A. T.
1988. A new species of *Crabro* from arctic Yukon (Hymenoptera: Sphecoidea: Crabronidae). Can. Ent. 120:859-865.
- Fontaine, M. and Y. Delange
1987. Jean-Henri Fabre, précurseur de l'écophysiologie, p. 123-132 in: Act. Cong. Jean-Henri Fabre, Ann. Jubilé (1910-1985). Paris.
- Frohlich, D. R., W. H. Clark, F. D. Parker and T. L. Griswold
1988. The xylophilous bees and wasps of a high, cold desert: Leslie Gulch, Oregon (Hymenoptera: Apoidea, Vespoidea). Pan-Pac. Ent. 64:266-269.
- Gambino, P. and G. M. Thomas
1988. Fungi associated with two *Vespula* (Hymenoptera: Vespidae) species in the eastern San Francisco Bay area. Pan-Pac. Ent. 64:107-113.
- Genise, J. F.
1988. Algunas observaciones sobre el comportamiento de *Anthosila erithropyga* (Burm.) (Hymenoptera, Anthroboscidae). Rev. Soc. Ent. Argentina 44:441.
- Gess, F. W. and S. K. Gess
1988. A contribution to the knowledge of the taxonomy and the ethology of the genus *Masarina* Richards (Hymenoptera: Masaridae). Ann. Cape Prov. Mus. (nat. Hist.) 16:351-362.
1988. A further contribution to the knowledge of the ethology of the genus *Ceramius* Latreille (Hymenoptera: Masaridae) in the southern and western Cape Province of South Africa. Ann. Cape Prov. Mus. (nat. Hist.) 18:1-31.
1988. A contribution to the knowledge of the ethology of the genera *Parachilus* Giordani Soika and *Paravespa* Radoszkowski (Hymenoptera: Eumenidae) in southern Africa. Ann. Cape Prov. Mus. (nat. Hist.) 18:57-81.
- Gordh, G.
1988. A new species of *Goniozus* Foerster from India (Hymenoptera: Bethyidae) used in biological control of *Diaphania indica* (Sanders) (Lepidoptera: Pyralidae). Pan-Pac. Ent. 64:173-182.
- Gusenleitner, J.
1988. Neue und bemerkenswerte Faltenwespen aus der Türkei (Hymenoptera, Vespoidea). Linzer biol. Beitr. 20:713-737.
1988. Bemerkenswertes über Faltenwespen IX (Hymenoptera, Vespoidea). Nach. Bayer. Ent. 37:107-113.
- Heath, R. R. and P. J. Landolt
1988. The isolation, identification and synthesis of the alarm pheromone of *Vespula squamosa* (Drury) (Hymenoptera: Vespidae) and associated behavior. Experientia 44:82-83.
- Henderson, M.
1988. The insect man: J. H. Fabre's good influence. Brit. J. Ent. Nat. Hist. 1:65-68.
- Hudson, W. G., J. H. Frank and J. L. Castner
1988. Biological control of *Scapteriscus* spp. mole crickets (Orthoptera: Gryllotalpidae) in Florida. Bull. Ent. Soc. Amer. 34:192-197.
- Hue, B. and T. Piek
1988. Effects of THR⁶ Bradykinin on synaptic transmission in the insect CNS. Pestic. Sci. 23:368-369. (*Megascolia*)
1988. Chapter 2. Effects of kinins and related peptides on synthetic transmission in the insect CNS, p. 27-33 in: Lunt, G. G., (edit.), Neurotox '88: Molecular basis of drug and pesticide action. Elsevier Sci. Publ. BV. (*Megascolia*)
- Hughes, C. R. and J. E. Strassmann
1988. Age is more important than size in determining dominance among workers in the primitively eusocial wasp, *Polistes instabilis*. Behaviour 107:1-14.
- Johnson, N. F.
1988. Midcoxal articulations and the phylogeny of the order Hymenoptera. Ann. Ent. Soc. Amer. 81:870-881.
- Jones, R. A.
1988. Mass emergence and apparent 'perching' behaviour of *Notozus panzeri* (F.) (Hymenoptera: Chrysididae). Brit. J. Ent. Nat. Hist. 1:189-190.
- Karst, H., A. Lind, et al.
1988. Block of transmission and glutamate re-uptake inhibition in insect muscle by synthetic delta-philanthotoxin. Pestic. Sci. 23:364-365.

1988. Effects of spider toxins on glutamate transmission and uptake. *Pestic. Sci.* 23:367-368.
- Kartsev, V. M., G. A. Mazokhin-Porshinyakov & S. A. Semenova
1988. [Asymmetry of trajectories in honey bees and paper wasps when foraging in experiments.] *Zool. Zh.* 67:1180-1185. (in Russian with English summary)
- Khalifman, J. and E. Vassilieva
1987. La lumière qui dure. Cent ans après. p. 179-184 in: *Act. Cong. Jean-Henri Fabre, Ann. Jubilé (1910-1985)*. Paris.
- Kimsey, S. L.
1988. *Hedychridium* of the Afrotropical region (Hymenoptera: Chrysididae). *J. ent. Soc. south. Africa* 51:193-205.
1988. *Loboscelidiinae*, new species and a new genus from Malaysia (Chrysididae, Hymenoptera) *Psyche* 95:67-79.
- Kitamura, K.
1988. Comparative studies on the biology of dryinid wasps in Japan. 5) Development and reproductive capacity of hosts attacked by *Haplogonatopus apicalis* (Hymenoptera, Dryinidae) and the development of progenies of the parasites in their hosts. *Kontyû* 56:659-666.
- Kojima, J.
1988. A new species of *Ropalidia* from Madagascar, with descriptions of mature larvae of eight *Ropalidia* species (Hymenoptera: Vespidae). *J. Kansas Ent. Soc.* 61:292-302.
1988. Description of mature larvae of *Belonogaster dubia* Kohl (Hymenoptera, Vespidae), with notes on the larval characters of the Polistinae. *Kontyû* 56:817-823.
- Kolarov, Ya., Yo. Stancheva and I. Sredkov
1988. A new pest - *Pemphredon inornatus* Say (Hymenoptera; Sphecidae) infesting cherry-trees in Bulgaria. *Soil Sci., Agrochem. & Plant Prot.* 22:95-98. (in Bulgarian with Russian and English summaries)
- Krivokhatskiy, V. A.
1985. [Insects of Repetek. A cadaster of species.] Ylym, Askhabad 71p. (in Russian; with aculeate checklist)
- Krombein, K. V. and P. M. Marsh
1988. Carl Frederick William Muesebeck 1894-1987, Honorary President, Entomological Society of Washington, 1971-1987. *Proc. Ent. Soc. Wash.* 90:513-523. (obituary with plates and publications)
- Kukuk, P. F., G. C. Eickwort, *et al.*
1989. Importance of the sting in the evolution of sociality in the Hymenoptera. *Ann. Ent. Soc. Amer.* 82:1-5.
- Kurczewski, F. E. and M. F. O'Brien
1988. A review of the nesting behavior and observations on *Tachysphex pompiliiformis* in North America (Hymenoptera: Sphecidae). *Ent. News* 99:173-180.
- Kurczewski, F. E., E. J. Kurczewski and M. G. Spofford
1988. Nesting behavior of *Aporinellus wheeleri* Bequaert and *A. taeniolatus* (Dalla Torre) (Hymenoptera: Pompilidae). *Proc. Ent. Soc. Wash.* 90:294-306.
- Kurzenko, N. V.
1988. [Contribution to the taxonomic status and classification of *Onychopterocheilus* Blüthg. (Hymenoptera, Vespidae, Eumeninae).] *Horae Soc. Ent. Unionis Sov.* 70:87-100. (in Russian)
- Landolt, P. J. and R. R. Heath
1987. Alarm pheromone behavior of *Vespula squamosa* (Hymenoptera: Vespidae). *Fla. Ent.* 70:222-225.
- Lane, M. A., F. E. Kurczewski and R. B. Hanna
1988. Antennal sensilla and setae of *Evagetes parvus* (Hymenoptera: Pompilidae). *Proc. Ent. Soc. Wash.* 90:428-439.
- Lavies, B.
1988. Peering into the world of wasps. *Nat. Wildlife* 26 (3):18-23. (color photographs)
- Leclercq, J.
1987. Jean-Henri Fabre noté alors et actuellement hors de l'espace francophone, p. 133-150 in: *Act. Cong. Jean-Henri Fabre, Ann. Jubilé (1910-1985)*. Paris.
- Lee, T.-S.
1981. Remarks on some Vespoidea (Hymenoptera) from Fujian, with description of a new species. *Wuyi Sci. J.* 1:197-199.
- Lelej, A. S.
1988. [Spider wasps of the genus *Priocnemis* Schiödte (Hymenoptera, Pompilidae) of the Far Eastern USSR]. *Horae Soc. Ent. Unionis Sov.* 70:74-87. (in Russian)
- Manley, D. G. and M. A. Deyrup
1989. Notes on the biology of *Dasymutilla pyrrhus* (Fox) (Hymenoptera: Mutillidae). *J. Ent. Sci.* 24:53-56.
- Martin, S. J.
1988. Thermoregulation in *Vespa simillima xanthoptera* (Hymenoptera, Vespidae). *Kontyû* 56:674-677.
- Matsuura, M.
1988. Ecological study on vespine wasps (Hymenoptera: Vespidae) attacking honeybee colonies. I. Seasonal changes in the frequency of visit to apiaries by vespine wasps and damage inflicted, especially in the absence of artificial protection. *Appl. Ent. Zool.* 23:428-440.
- McCorquodale, D. B. and I. D. Naumann
1988. A new Australian species of communal ground nesting wasp, in the genus *Spilomena* Shuckard (Hymenoptera: Sphecidae: Pemphredoninae). *J. Aust. ent. Soc.* 27:221-231.
- Michener, C. D. and D. A. Grimaldi
1988. The oldest fossil bee: Apoid history, evolutionary stasis, and antiquity of social behavior. *Proc. Natl. Acad. Sci. USA* 85:6424-6426.
- Móczár, L.
1987. Rovarbölcsök. Gondolat Kiadó, Budapest. 187 p. (on the stages of insect sociality; in Hungarian with many photographs)
- Nakajima, T., T. Piek, T. Yasuhara and P. Mantel
1988. Kinins isolated from the venom of the solitary wasp *Megascolia flavifrons*. *Pestic. Sci.* 23:366-367.
- Ooman, P.
1989. Ooit een tangwesp gezien? *Ent. Ber.* 49:18. (Dryinidae)
- Orlov, B. N., N. V. Korneva and N. F. Vasilyev
1988. Catching technique for social aculeate insects. *Zool. Zh.* 67:1714-1716. (in Russian with English summary and illus.)
- Pagliano, G.
1988. Philanthinae italiani (Hymenoptera: Sphecidae). *Boll. Mus. reg. Sci. nat. Torino* 6:133-174.

- Pauly, A. and M. Olmi
1988. Les Dryinidae de Belgique. Notes faun. Gembloux 17:15-27.
- Petersen, B.
1988. The Palaearctic Mutillidae of I. C. Fabricius and some related material (Insecta, Hymenoptera, Aculeata). Steenstrupia 14:129-224.
- Piek, T., J. O. Schmidt, J. M. de Jong and P. Mantel
1989. Kinins in ant venoms - a comparison with venoms of related Hymenoptera. Comp. Biochem. Physiol. 92C:117-124.
- Piek, T., B. Hue, *et al.*
1988. Effects of the venom of *Colpa interrupta* (F.) on vertebrate smooth muscle and synaptic transmission in insect CNS. Pestic. Sci. 24:266-267.
- Piek, T., B. Hue, *et al.*
1988. The wasp *Ampulex compressa* changes the behaviour of the cockroach. Pestic. Sci. 24:268-270.
- Piek, T., R. H. Fokkens, *et al.*
1988. Chapter 5. Polyamine like toxins - a new class of pesticides?, p. 61-76 in: Lunt, G. G., (edit.), Neurotox '88: Molecular basis of drug and pesticide action. Elsevier Sci. Publ. BV. (based on the toxin of *Philanthus*)
- Ponomarenko, N. G.
1988. [New species and genus of *Prioranteon* Olmi (Hymenoptera, Dryinidae from Central Asia)]. Horae Soc. Ent. Unionis Sov. 70:73-74. (in Russian)
1988. [First find of a male dryinid (Insecta) from Baltic Amber.] Paleon. Zh. 4:107-108. (in Russian)
- Queller, D. C., J. E. Strassmann and C. R. Hughes
1988. Genetic relatedness in colonies of tropical wasps with multiple queens. Science 242:1155-1157.
- Raw, A.
1988. Social wasps (Hymenoptera: Vespidae) and insect pests of crops of the Suruí and Cinta Larga Indians in Rondônia, Brazil. Entomologist 107:104-109.
- Reyes, S. G.
1988. A review of philippine Stenogastrinae (Hymenoptera: Vespidae). Philipp. Ent. 7:387-434.
- Roig Alsina, A.
1988. Contribucion al conocimiento de los Pepsinae Sudamericanos IV. El genero *Sphictostethus* Kohl (Hymen., Pompilidae). Rev. Soc. Ent. Arg. 44:277-315.
- Rosenheim, J. A.
1988. Parasite presence acts as a proximate cue in the nest-site selection process of the solitary digger wasp, *Ammophila dysmica* (Hymenoptera: Sphecidae). J. Ins. Behav. 1:333-342.
- Santiago-Blay, J. A. and H. V. Daly
1988. The Apoidea collection of the California Insect Survey (C.I.S.) at the Essig Museum of Entomology, University of California, Berkeley. Pan-Pac. Ent. 64:281-284.
- Scaramozzino, P. L. and I. Currado
1988. Prime notizie sull'approvvigionamento dei nidi pedotrofici di *Isodontia mexicana* (Saussure) in Italia (Hymenoptera: Sphecidae). Atti XV Congr. naz. ital. Ent., L'Aquila, 1988:871-878.
- Schluter, N. C. M., A. Lind, *et al.*
1988. Inhibition of transmission and reduction of glutamate uptake in rat hippocampus by *Delta*-philanthotoxin. Pestic. Sci. 24:273-274.
- Schmidt, J.
1988. The warrior wasps of Lomas Barbudal. Bee Line (Friends of Lomas Barbudal) 2(3):12-13.
- Sorg, M. and A. W. Walker
1988. A new species of bethylid wasp (Hymenoptera) from New Zealand, with comments on its life history and host. J. Nat. Hist. 22:1483-1488.
- Starr, C. K.
1987. Jean-Henri Fabre en face de la biosystématique, p. 75-114 in: Act. Cong. Jean-Henri Fabre, Ann. Jubil (1910-1985). Paris.
1988. Jean-Henri Fabre and his entomological emotions. Arsenal/Surrealist Subversion (6):118-119.
1988. The ins and outs of a tropical social wasp nest. Proc. Ent. Soc. Wash. 91:26-28.
1989. In reply, is the sting the thing? Ann. Ent. Soc. Amer. 82:6-8.
- Steiner, A. L.
1987. Fabre et les guêpes solitaires, p. 71-74 in: Act. Cong. Jean-Henri Fabre, Ann. Jubilé (1910-1985). Paris.
- Steyskal, G. C.
1988. Languages of Entomology. Bull. Ent. Soc. Amer. 34:53-54.
- Strassmann, J. E., D. C. Queller and C. R. Hughes
1988. Predation and the evolution of sociality in the paper wasp *Polistes bellicosus*. Ecology 69:1497-1505.
- Suzuki, T.
1987. Egg-producers in the colonies of a polistine wasp, *Polistes snelleni* (Hymenoptera: Vespidae), in central Japan. Ecol. Res. 2:185-189.
- Truc, C.
1987. Le cycle nidificateur de l'Ammophile hérissée, *Podalonia hirsuta* Scopoli, film d'une durée de 25 mn environ, p. 151 in: Act. Cong. Jean-Henri Fabre, Ann. Jubilé (1910-1985). Paris.
- Tsuneki, K.
1988. Pompilidae recently collected in the Philippines (Hymenoptera). Special Pub. Japan Hymen. Assoc. (34): 1-55, 61
1988. Some spider wasps from Thailand and Borneo (Hymenoptera). Special Pub. Japan Hymen. Assoc. (34): 56-61.
- Turillazzi, S.
1987. Brood rearing and the origin of sociality in stenogastrine wasps (Hymenoptera, Vespidae). Ecol. Persp. Soc. Presoc. Arth. (36):27-28.
1988. Social biology of *Parischnogaster jacobsoni* (Du Buysson) (Hymenoptera Stenogastrinae) Ins. Soc. 35:133-143.
- Venkataraman, A. B., V. B. Swarnalatha, P. Nair & R. Gadagkar
1988. The mechanism of nestmate discrimination in the tropical social wasp *Ropalidia marginata* and its implications for the evolution of sociality. Behav. Ecol. Sociobiol. 23:271-279.
- Wcislo, W. T., M. J. West-Eberhard and W. G. Eberhard
1988. Natural history and behavior of a primitively social wasp, *Auplopus semialatus*, and its parasite,

- Irenangelus eberhardi* (Hymenoptera: Pompilidae). J. Ins. Behav. 1:247-260.
- Weaving, A. J. S.
1988. Prey selection in several sympatric species of *Ammophila* W. Kirby (Hymenoptera: Sphecidae) in southern Africa. Ann. Cape Prov. Mus. (nat. Hist.) 16:327-349.
1988. Nesting strategies in some southern African species of *Ammophila* (Hymenoptera: Sphecidae). J. Nat. Hist. 23:1-16.
- Wheeler, G. C.
1988. Chapter 2. The compleat taxonomist, p. 11-15 in: Trager, J. C., (edit.), Advances in Myrmecology. E. J.

- Brill, Inc. 551 pp.
- Wolf, H.
1988. Zur Kenntnis der Gattung *Tachyagetes* Haupt 1930 (Hymenoptera, Pompilidae). IV. Linzer biol. Beitr. 20:779-828.
1988. Bewohner von Schilfgallen in den Naturschutzgebieten „Am Berger Hang“ und „Enkheimer Ried“ in Frankfurt am Main (Insecta: Diptera, Hymenoptera). Hessische Faun. Briefe 8:16-18.
- Yamane, S.
1988. A preliminary note of the thermal property in two different types of *Ropalidia* combs (Hymenoptera, Vespidae). Kontyû 56:896-900.



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