JANUARY 1990

SPHECOS 19

A FORUM FOR ACULEATE WASP RESEARCHERS

EDITORIAL PROFUNDITIES

Here we are, still going strong 10 years later! This issue was supposed to appear last October, but Terry's work schedule kept getting pushed back and I didn't get his services until the end of November. Better late than never, but to qualify as a "newsletter" **Sphecos** should appear every 6 months. Otherwise, the news is no longer current.

We now have a FAX machine (our number is (202) 786-9422), and material for future issues can be sent to me via that device by those of you having the capability to do so. We can return edited copy to you via FAX for your approval providing you give us your FAX number.

Some people have sent material for this issue on diskettes, and those of you with computers handy may want to consider using this mode of transmitting copy for future issues of **Sphecos**. We use a Macintosh for producing **Sphecos** so copy written on a Mac in McWrite, Microsoft Word or ASCII text and sent on a 3 1/2" diskette is our first choice. If you use an IBM or compatible computer, copy in Wordperfect, Microsoft Word or (preferably) ASCII on a 5 1/4" diskette can be used since we can convert these formats for use on the Mac. Also, please be sure to indicate what format (or software) you used.

In our last issue we hailed the use of a scanning system to copy material onto the Mac, but in actual practice this did not save much time nor was it error free. Italics, underlining, single spacing, and closely-spaced words (leading to whole sentences clumped together as one word, YoYo!) all serve to confuse our modest scanning program and should be avoided in future submissions.

This issue contains quite a few book reviews, a large array of Scientific Notes, some interesting Collecting Reports, and the usual Forum fun. Of particular interest is Jim Carpenter's reanalysis of Brothers' classic 1975 work on aculeate phylogeny followed by a companion piece by Dave Wahl. Robin Edwards has provided another literature supplement on the Vespinae. Most of the material submitted to **Sphecos** is still generated by a few "regulars". We need to hear from more of you!

Coming up in the next issue will be a list of the aculeate type material of Juan Brèthes (mostly in Buenos Aires) by Jorge Genise. I am also trying to persuade Mick Day and Jim Carpenter to submit a piece on wing venation terminology for **Sphecos** 20.

There has been a decline in research news the past few issues. Most of what I present in the current number was captured from my correspondence. How about bringing the readership up-to-date on your current activities. FAX me a paragraph or two on your current research for **Sphecos** 20.

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As promised in **Sphecos** 18, some of the humor from the past 10 years of the newsletter is reprinted in this number, along with some new stuff. I want to thank Fernando Fernandez C. of Bogotá Colombia, for the 10th anniversary cartoons included in this issue.

RESEARCH NEWS

Herman Dollfuss (Franz Höglgasse 4, A-3100 St. Pölten, Austria) reports: "My revision of *Pemphredon* is progressing well. There will be many new synonymies for the species described by MERISUO and VALKEILA 1972. I have seen all types but I need more material from Central Asia. Maybe the variation is greater than we thought before. In the Nearctic material two new species are included."

Allan Hook (Division of Biological Sciences, St. Edward's University, 3001 South Congress Ave., Austin, Texas 78704) writes that Dave Peckham came to Austin in late May for a 3 week visit to study *Oxybelus*. Then in early June, Allan was in Alberta and Saskatchewan for a 3 week stay to visit 2 expansive dune sites and look for sphecids. Next he spent July in California, primarily doing field studies at Jasper Ridge (Stanford's field station).

Rolf R. Kohring (Institute of Paleontology, FU Berlin, Schwendenerstr. 8, 1000 Berlin 33, F. R. Germany) writes: "My interest is Paleoentomology, and I am working with insects from Sicilian Amber (Hemiptera, Coleoptera, Diptera and Hymenoptera), presumably Upper Miocene age."

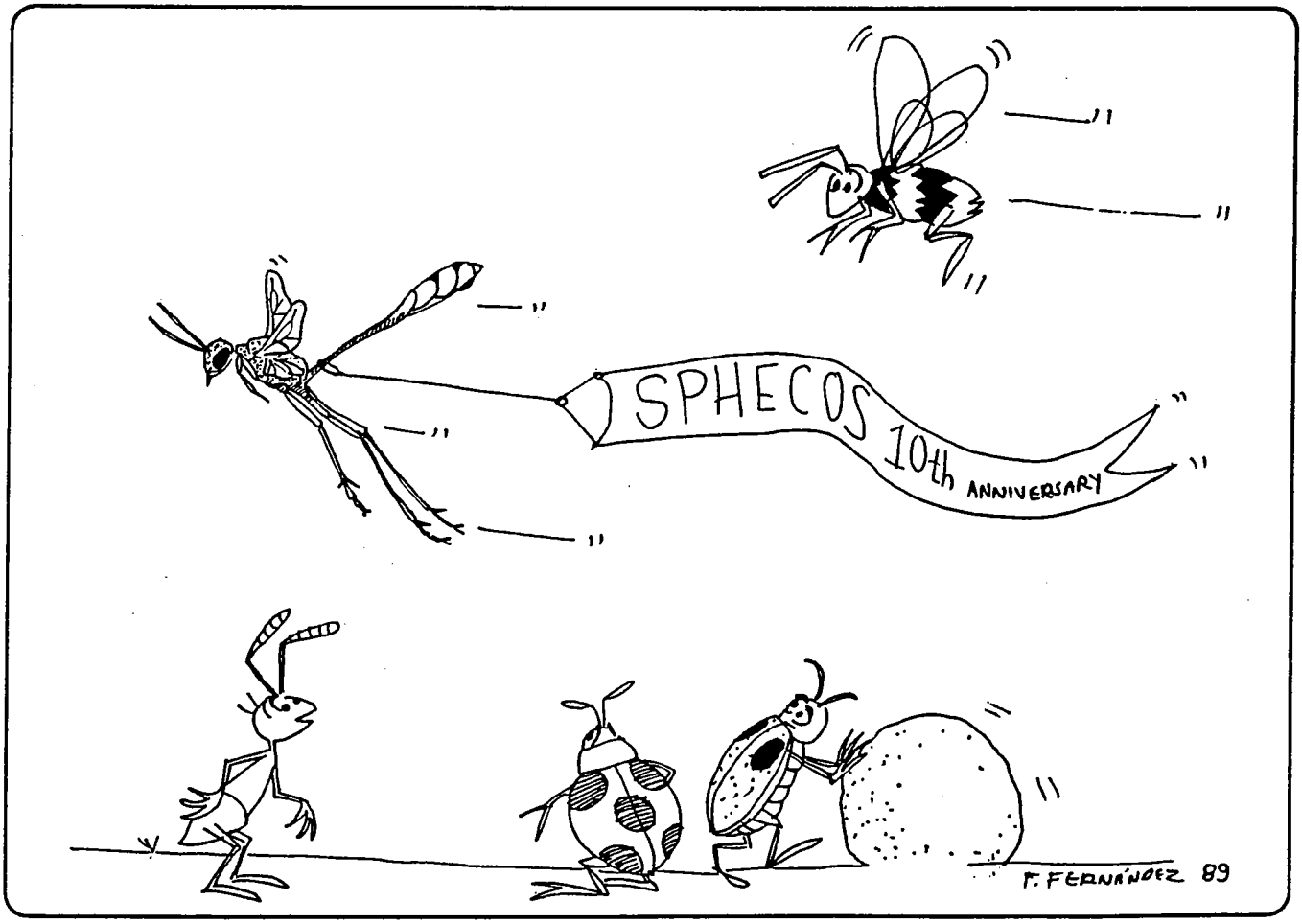
Lech Krzysztofiak (Stacja Doswiadczalna IBL, Krzywe 82, 16-400 Suwalki, Poland) tells us: "I am working at the newest experiment station of the Forest Research Institute in Warsaw. Our station is located in the north of Poland. We are interested in social insects (ants, wasps, bees), their ecology, ethology and diversity."

David McCorquodale (Department of Biological Sciences, University of Calgary, Calgary, Alberta T2N 1N4 Canada) writes: "I am now doing an NSERC post-doc here in Calgary. I have returned to Writing-On-Stone Park in southern Alberta, where I did my masters fieldwork, to look at nest switching and oocyte development in *Cerceris echo* and several *Philanthus*. I will also be doing some protein electrophoresis on these philanthines to look at levels of heterozygosity, population structure and hopefully phylogenetic relationships."

Sulene Noriko Shima (Departamento de Zoologia, I.B. UNESP - Campus de Rio Claro, C.P. 178, 13.500 - Rio Claro (SP), Brasil) reports: "My research is about caste differentiation in social wasps of the tribe Polybiini. My objective is to study the variability and degree of differentiation of the castes from a morphological and ethological point of view. I have studied the morphological distinction between queens and workers of eight species through measurements of 23 characters and by a detailed analysis of the internal and external morphology. The morphometric data have been analysed by the Canonical Discriminant and Mahalanobi's Generalized Distance."

Arnold Menke is well into his revision of the New World species of the sphecid genus *Larra*. Although there are over 20 names available, only 6 species appear to be present in this fauna, one of which, *analis*, occurs only in North America. Males of *analis* and two closely related tropical species are frustratingly similar although their females are distinct. Anyone having Neotropical *Larra* is urged to send it on loan to Menke for use in the revision.

Arnold is also dabbling with *Pison* in the Australasian area, particularly species in which the mandible is obliquely truncate apically in both sexes. New Guinea and Australia contain a number of species in this complex, mostly undescribed. Ian Naumann is working on the Australian forms while Arnold is concerned with the New Guinea species. The genus *Aulacophilinus* Lomholdt, described from the Soloman Islands, has the same mandible and perhaps all species sharing it should be placed in the genus (or else *Aulacophilinus* is a synonym of *Pison*).



NECROLOGY

Dr. Martin Hoop, of Kiel, Federal Republic of Germany, died in February, 1987, at the age of 80. In his publications Hoop mainly treated the fauna of Symphyta and Aculeata in northern Germany.

Dr. Stellan Erlandsson, of Stockholm, Sweden, died on June 15, 1989, at the age of 86.

OBITUARIES

Luciano E. Campos

Professor Dr. Luciano E.(liot) Campos, an outstanding and well known Chilean entomologist, died of cancer at his home on January 1st, 1989, at mid-day. Born in Sao Paulo (Brazil) on February 19, 1927, while his father was Chilean Consul in that city, Luciano was short of 62 when he died after bravely fighting the terminal disease for about four years.

Luciano graduated from the State University in Santiago around 1950 and in 1952 he accepted a junior position at the Ministry of Agriculture to work as a starting Entomologist at the Division of which I was Chief in those years. He started as a Taxonomist identifying all sorts of harmful bugs which came to our attention, much as in the old Bureau of Entomology and Plant Quarantine in the U.S. We were both attracted by the tachinid flies (Diptera) and their taxonomy, biology and insect hosts, and by 1971, we had published, either together or separately, a score of papers on these attractive calyptrates.

In the late '50s he got a scholarship that allowed him to enroll at the University of California at Davis where he received a M.Sc. degree, and during the '60s he got a Rockefeller grant to obtain his Ph.D., also at Davis.

Upon his return to Chile he left the Ministry and preferred to work at the State University as Assistant Professor of Entomology (both under- and post-graduate) and taught there until 1987 when he had to retire due to the fatal disease which was preying upon him. During 1971-1973 he was elected Dean of the Faculty, and during the same years appointed as President of the Chilean Society of Entomology, in which capacity he presided over the celebration of the 50th anniversary of the Society.

During his University years he showed a real interest in the Chrysididae, and he developed a good representative collection of Chilean species. In 1960 he published a revision of the genus *Omalus* with R.M. Bohart, his major professor at Davis.

He made several visits to the U.S., including California, the U.S. National Museum in Washington and Gainesville, Fla., where he took a post-doctorate leave during 1980.

He published several papers in Chile and elsewhere, yet his last contributions were mostly on economic problems caused by insects to Chilean fruit crops.

He will be remembered as a kind, friendly person always perpared to help and to listen when his advice and authority were consulted. To the old Professor that introduced him to insects and nurtured his early formative years, his untimely death is an irreparable bitter loss.

Raúl Cortés
Instituto de Entomologia
Universidad Metropolitana
de Ciencias de la Educación
Santiago, Chile

Robert Oscar Schuster
1928 - 1989

Bob Schuster, Senior Museum Scientist and acting curator for the Bohart Museum at the University of California, Davis, was well known to a wide range fo entomologists. Under his management of 23 years the Bohart Museum grew from 40 museum cases and 500,000 pinned specimens to presently over 300 cases and about 3 million pinned specimens. Bob's research covered many fields including mites, pseudoscorpions, tardigrades, and beetles. He was author or co-author of about 61 papers, only one of which dealt with aculeate wasps (with R.M. Bohart, 1972. A host record for *Fedschenkia*. Pan-Pac. Ent. 48: 149). This was the first record of *Pterocheilus* as the host of this peculiar sapygid. He collected extensively in Hymenoptera and helped bring the Davis collection to its position as one of the best among universities. He will be long remembered by local friends and associates as well as many former students who contributed to the Museum.

R.M. Bohart
Department of Entomology
University of California
Davis, CA 95616

NEW ADDRESSES

John T. Burn: 1 Sycamore Avenue, Armthorpe, nr, Doncaster, S. Yorks., England DN3 3HQ.

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Josef Gusenleitner: Pfitznerstr. 31, A-4020 Linz/Donau, Austria.

Raimond V. Hensen: Vultostraat 147, 3523 TW Utrecht, Holland.

Lynn Kimsey: Department of Entomology, University of California, Davis, CA 95616.

John A. Kochalka: Ministerio de Agricultura y Granaderia, Inventario Biológico Nacional, Sucursal 19, Ciudad Universitaria, San Lorenzo, Paraguay.

David McCorquodale: Biological Sciences, The University of Calgary, 2500 University Drive N.W., Calgary, Alberta, Canada T2N 1N4.

Laszlo Móczár: Szabolcska Mihály u. 1. 111/1, H-1114 Budapest, Hungary.

Laurence Packer: Biology Department, York University, 4700 Keele St., North York, Ontario, Canada M3J 1P3.

Jay A. Rosenheim: Department of Entomology, The Hebrew University of Jerusalem, P.O. Box 12, Rehovot 76-100, Israel.

John W. Wenzel: Department of Entomology, University of Georgia, Athens, GA 30602.

Wanted:
Eopsis beaumonti Benson, 1959
(Hymenoptera, Tentredinoidea)

In 1959, Benson described a new genus and a new species of sawflies (Hymenoptera, Tentredinoidea) from Switzerland on the basis of material collected by the late Prof. J. de Beaumont (Musée zoologique, Lausanne). The type material was constituted by 1 female holotype and 3 males paratypes. According to Benson's publication (Proc. R. Ent. Soc Lond. (B), 28: 121-123, 1959), two specimens (the holotype and 1 paratype) were kept at the Musée zoologique in Lausanne, the two others paratypes at the British Museum (Nat. Hist.) in London.

In 1971, the Lausanne's specimens have been sent to Dr. W. Stritt (Karlsruhe, FRG) by the former curator of our museum, J. Aubert.

Recently, we undertook a revision of the type material deposited in our museum. The specimens of *E. beaumonti* were still missing. Dr. W. Stritt passed in 1975, and his collection was deposited in the "Landessammlungen für Naturkunde" in Karlsruhe. Prof. U. Roesler kindly checked Stritt's collection but was unfortunately unable to find this material (letter of June 10th 1986).

Since then, we found no other information on these specimens. We take the opportunity to inform the hymenopterists of that situation. If someone could help us finding this material, we would be very grateful (swiss chocolates will be generously offered). Otherwise, the generotype of *Eopsis* (type species: *E. beaumonti*) has to be considered lost.

Michel Sartori & Daniel Cherix
Curators

(Musée zoologique, Palais de Rumine, CP 448, CH-1000 Lausanne 17, Switzerland)

MISSING PERSON

Jörg Weipert of Jena, East Germany.

FAX NUMBERS

Listed here are a few FAX numbers. Send us yours, if you have one, and we will print them in the next **Sphecos**. Country codes are in parentheses.

British Museum (Nat. Hist.), London: (44) 1 938 8937.
Robin Edwards, East Grinstead, England: (44) 0342 326229.
Ron McGinley, Washington, DC: (1) 202 786-2894.
Ian Naumann, CSIRO, Canberra: (61) 062 47 0217.
Wojciech Pulawski, San Francisco, Calif.: (1) 415 750-7346.
Roy Snelling, Los Angeles, Calif.: (1) (213) 746-2999.
Marius Wasbauer, Sacramento, Calif.: (1) 916 322-5913.

HELP NEEDED

Alexander Antropov (Zoological Museum of the Moscow Lomonosov State University, Herzen Street 6, Moscow K-9, USSR) is doing a taxonomic study of *Pison* in the *agile* group and requests loans of material of this east Asian and Oriental assemblage. These are *Pison* with only two submarginal cells in the forewing and densely setose eyes.

SPHECOS 18 MISCELLANEA

Misc. Notes and Rabble
by
Justin O. Schmidt
(Southwestern Biological Institute
1961 W. Brichta
Tucson, Arizona 85745)

1). Tisk, tsk. Our editor has blundered. *Paraponera clavata* is not the largest New World ant (species) (see **Sphecos** 18:18). All of the ants of the Amazonan genus *Dinoponera* (*grandis*, *gigantea*, etc.) are larger. I suspect you will get several comments on this one, especially from the more catholic aculeatists.

2). In spite of the blunder above, the comments about *Paraponera* are also basically right on - these beasts are "fun to collect" and, indeed, are very strong. One day I was testing them as spicy prey for a megalamorph spider *Filistata arizonica* (which, incidentally, had eaten essentially every other prey offered) and it looked as if the spider had the ant. The poor ant was all wrapped up in silk and could hardly move (the spider was, however, still cautious in its approaches and could not successfully bite the ant). After a half hour of watching, I got bored and left the ant as a goner. Upon returning 8 hours later, all the webbing was in a corner, and the ant was triumphantly standing in the middle of the cage grooming off the last of the silk.

3). After years of telling people that *Myrmecia* (bull ant) stings really aren't bad (and never being believed - especially by Australians), it was nice to hear from an authority no less than Roy Snelling (who has probably been stung by just as many species as I) that they are "pussy-cats" (**Sphecos** 18:16). I equate their stings to those pollen pigs (*Apis mellifera*). Incidentally, I think that in his note Roy wins the award for the most exclamation points in a single paragraph!

4). Your comment that *Paraponera* is "one of the worst stingers known to man" prompts me to make this challenge: I am quite certain that *Paraponera* is, in fact, **the** worst stinging aculeate in the world. I challenge anyone to find a more painfully stinging hymenopteran - my offer is a six-pack of one's favorite beer to whoever can show me wrong!

5). Frank Parker's talent in catching screw worm flies by attracting them to ancient liver is undoubtedly unsurpassed (**Sphecos** 18:12). As is the resistance of his nose to the aroma! I believe he enjoys the reactions of his visitors to the essence (especially when he flops his net right on top of the heap [to catch the flies]) almost as much as the fly catching.

6). Thanks to Al Hook for pointing out that some sphecids can and do sting humans (**Sphecos** 18:12). This is a subject of potential sensory as well as theoretical interest. Do any other readers have stories of being stung by sphecids that were "defending" their nests? There is a report (O'Conner, R.,

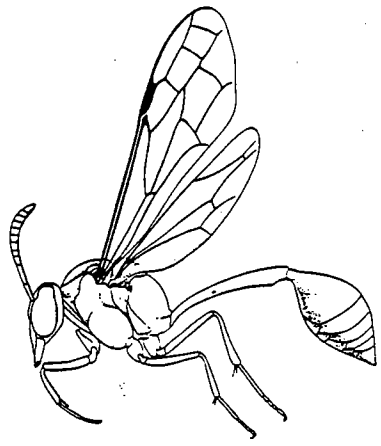
et al. 1964, **Ann. Allergy** 22:385-393) in which a "mud dauber" wasp caused an anaphylactic death of a 48 year old man. This is, however, the only case of serious damage I have ever heard of as a result of a sphecid sting.

7). A candidate for the endangered list: *Dasymutilla archboldi.* This beast lives only in the environs of Archbold Station in Florida (where it is abundant but highly localized).

Comments
from
Robin Edwards

John MacDonald may be interested in one of the references in the Vespine Literature Supplement (p. 39), namely that of Fuchs & Ippen, 1987. This does not quite fit his "Help Needed" requirement (**Sphecos** 18:3), but will probably be worth looking at.

Regarding Arnold's second editorial comment in my last item on the subspecies debate (**Sphecos** 18:6), I cannot agree that "sentamentalism" (sic) is involved: all I am interested in is the "practicality" of it all. [Robin, I guess those of us that eschew the subspecies concept regard it as impractical. Why? Well most subspecies in my experience are based on geographic color differences, but except for insular forms, these supposedly distinct color morphs usually vary clinally. The implication of that is obvious. Furthermore it is known that color is influenced by ecological factors (humidity, temperature, etc.) or even microclimate within a nest (see MacLean, Chandler & MacLean, 1978, **Great Lakes Ent.** 11:105-116.) - edit.]



Eustenogaster scitula (Bingham)

FORUM

Common Names for Aculeates
by
Justin O. Schmidt
(Southwestern Biological Institute
1961 W. Brichta
Tucson, Arizona 85745)

Aculeates are interesting insects. They are often large, colorful, sting (which usually gets ones attention), have interesting behaviors and biology, and, importantly, attract the attention of "lay people". In this world of growing populations and shrinking natural environments, we need concerned and interested lay audiences and we should strive to make their appreciation of aculeates easier. Common names for our favorite insects is one area in which we could help to increase the interest of amateurs and others. Let me relate how I believe this could help.

I have been actively involved in conducting research in and attempting to preserve the Costa Rican national park called Lomas Barbudal. Jutta and Gordon Frankie have established a non profit organization called "Friends of Lomas Barbudal" that is concerned with generating contributions to sustain the park. That is done partly via a nice newsletter called **Bee Line**. Although I do my work in Lomas on Africanized pollen pigs, I write articles on wasps for the **Bee Line**. Incidentally, the reason I write on wasps is because they are darn interesting. Anyway, the readership seems to really like the articles (see **Sphecos** 16:24 for an example article) and we hope they will be a force to help in conservation efforts for the world's only park based primarily on its insect fauna (centridine bees).

This brings me to the point of this note. How do we communicate to the public about wasps (or ants or bees)? I have written on *Synoeca septentrionalis*, *Parachartergus fraternus*, *Polybia occidentalis*, *Brachygastra mellifica*, and will write on *Polistes canadensis*, *Agelaia myrmecophila*, *Apoica pallens*, etc. As you can tell, these names are rather cumbersome for nonspecialists, and, worse, are probably intimidating or outright "turn offs". We need common names. When I write about these wasps I have called them respectively "warrior wasps", "artistic wasps", "little wasps", "honey wasps" and for the future ones, I plan to call them "red wasps" (because in Spanish they are called "avespa rojo"), "fire wasps" (in Spanish called "avespa de fuego"), and "evening wasps" or "night wasps" (I am not sure which I like better - any suggestions?). One of the names I used is established - the "honey wasp"; one is hopefully now established - the "warrior wasp"; two hopefully will be be accepted - "red wasp" and "fire wasps"; and two of my names are bad - "artistic wasp", "little wasp". The problem with these names is that one person - in this case, me - invented them. Obviously, there are fallibilities in making common names this way. What we need is a system to make "logical" common names if at all possible.

My suggestion is that **Sphecos** serve as an informal organ for providing common names for species outside the U.S. In the U.S. the Entomological Society of America does the service of screening and officially accepting common names. **Sphecos** could do the same for all aculeates. Why **Sphecos**? Because **Sphecos** is probably more widely read by aculeatists than any other single printed source; because **Sphecos** is the umbrella newsletter for aculeates (granted, two specialized and derived aculeate taxa have their own newsletters, but they are newer, smaller, and narrower); and because the readership of **Sphecos** is never at a loss for an opinion. A reader could suggest a common name and why we need it. Then the readership can have at it. If it is a bad name (like my "artistic wasp" - though in my own defense, I used that name purely for the purpose of entertaining my intended audience) that fact will become evident.

The advantage of such an arrangement is that especially bad common names will be weeded out, better names might be suggested, and, overall, there will be some sense in our attempt to consistently communicate with the public. The alternative is that people will simply invent common names. Do we want that? Can I suggest that we start with comments on my already used, and, especially, on my three proposed common names? I would justify those three, except I have already written too much. Maybe next round.

Vespida vs. Hymenoptera: A Response to Rasnitsyn

by
Curtis W. Sabrosky
(205 Medford Leas, Medford, N.J. 08055; Cooperating Scientist, Systematic Entomology Laboratory, U.S. Department of Agriculture, Agriculture Research Service)

My good friend Rasnitsyn's note on "Vespida vs. Hymenoptera" (**Sphecos** 18:8) raises again the question of deriving ordinal names from generic names (typification). This approach was proposed in modern times, long before Rohdendorf (1977), by H.B. Stenzel in 1950 (**Science** 112:94). Stenzel had proposed a series of different endings to signify the various ranks of the taxonomic hierarchy, so that for a type genus *Musca* for example, each taxon based on *Musca* would have the stem *Musc-* plus a unique ending through the family-, order-, class- and phylum-groups. Laicharting (1781) did not go that far because in his time only orders were used between class and genus, but he did have a uniform ending. His -oides attached to a generic name signified an order. Essentially, then, Laicharting and Stenzel agree on using typification for names of higher taxa, with uniform endings.

The Colloquium on Nomenclature held before the XIV International Congress of Zoology in Copenhagen in 1953 (Cf. "Copenhagen Decisions on Zoological Nomenclature," 1953) discussed in some detail "rules for the naming of Orders and Higher Taxonomic Categories" and made a number of recommendations. These were written out formally in the so-called Bradley Draft of a new Code, as published in the **Bulletin of Zoological Nomenclature**, volume 14 (1957-58). That draft was thoroughly reviewed and debated as a second Colloquium on Nomenclature that preceeded the XV International Congress of Zoology at London in 1958, at which were taken the basic decisions for the new International Code of Zoological Nomenclature, published in 1961. The overwhelming reaction was that while typification and uniform endings were well established in the family group, names of higher taxa (order group and above), not founded on generic names and with different endings standard in different animal groups, were so firmly entrenched in the literature that it would be exceedingly upsetting in zoology and general biology to change at this late date to a different system, regardless of priority. Thus -ptera endings for the orders of insects, -iformes in Aves, and -poda in Mollusca were considered to be so well established and so well known to non-taxonomists that no useful purpose would be served in changing.

Another factor of some importance in the Laicharting-Stenzel approach is the large number of confusingly similar endings that would have to be devised and agreed upon - and remembered! - for the names of the numerous, including the supra- and subdivisions that are used in the larger groups in the taxonomic hierarchy. And once one starts, it would be illogical to have a mixture of typified and non-typified names, such as an order Vespidae but a suborder Parasitica, etc., etc.

In the end, the Colloquium and Congress of 1958 decided to eliminate from the code any rules for higher taxa, and to limit the Code's coverage to the family, genus, and species groups. That could change, of course, even as the London Congress changed from the Copenhagen decisions. However, I personally doubt very much that a consensus today would be much different from that of London. It is not merely a case of Vespida vs. Hymenoptera; typified names would change the names of all major orders of insects and most of the minor ones, and indeed most orders of all animals! I have a hunch that Hymenoptera, as well as Diptera, Coleoptera, etc., will survive even the latest challenge.

On Vespida, Subspecies, Name Changes, etc.

by
Roy R. Snelling
(Dept. of Entomology, Natural History Museum of Los Angeles Co. 900 Exposition Blvd. Los Angeles CA 90007)

The proposal to change Hymenoptera to Vespida is asinine. The original names have rather a lengthy history and somewhat more than infrequent use in the literature; to dump those names would only convince non-systematists that we are a bunch of out-to-lunch loonies. Who needs it? Besides, what real purpose would it serve? None that I can see. I'll turn Rasnitsyn's question on its head: why should ordinal names conform to the same regulations as family names? A little room for non-conformance is kinda nice. Too many rules are like too many cooks! Danged bureaucrats want to regulate everything in sight.

Re Edwards on subspecies (**Sphecos** 18:6):

What a silly fellow. Nobody (1 possible exception!) is going to cite the north Philippine color form of *Vespa tropica* in that manner. What nonsense. It is merely the northern color phase and that's all. It's also enough. Already. Some there are who will persist in calling it *V. tropica deusta*. As for keeping "just a FEW of the old subspecific names" - In for a penny, in for a pound says I. Archer can't have it both ways. The "difficult to resolve forms" can be treated as species until their status is resolved. Or they can be treated as synonyms until shown otherwise.

Mich's note on "Name changes to be avoided" (**Sphecos** 18:5) is timely and to the point; I couldn't agree more, especially with his comments re tranfer of a name from one species to another. In those cases involving frequently used names I think that the effort should be to conserve names in their long established identity.

Rasnitsyn on Chrysidoidea, or what is a cladist really?

by
James M. Carpenter
(MCZ, Harvard University Cambridge MA 02138)

The publication in English of a summary of A. P. Rasnitsyn's system for Hymenoptera (Rasnitsyn, 1988, **Oriental Insects** 22: 115-145) is a welcome event, enhancing the accessibility of his research. Most of the paper consists of a diagnosis of the system laid out in 1980 [in Russian], modified after taking into account papers such as mine on Chrysidoidea (Carpenter, 1986, **J. N. Y. Ent. Soc.** 94: 303-330). Rasnitsyn accepts some of the system and characters laid out in my 1986 paper (e.g. a distant

relationship between Scolebythidae and Chrysididae + Bethylidae), but others he does not. He continues to insist upon a sister-group relationship between Embolemidae and Chrysididae + Bethylidae, rather than grouping embolemids with dryinids. It is these points of disagreement I wish to comment upon, for Rasnitsyn's paper contains several errors of fact and interpretation.

Many of the problems stem from Rasnitsyn's rejection of parsimony as used in phylogenetic analysis. He states (p. 115) that he accepts phylogenetic systematics, but explicitly disavows parsimony. In so doing, he in fact rejects phylogenetic systematics - as Farris (1983, **Advances in Cladistics** 2: 7-36) has shown, parsimony is not merely a methodological convenience. It is crucial for phylogenetic analysis (indeed, for science itself). Parsimony is eqiuivalent to minimizing hypotheses of homoplasy (i.e., convergence and reversal). Homoplasy is hypothesized to explain away characters which do not support a given genealogy, and such hypotheses are therefore ad hoc, amounting to dismissal of evidence - because the homoplastic characters, of course, support an alternative genealogy. Unless the requirement of minimizing ad hoc hypotheses of homoplasy is maintained, any character evidence can be dismissed in order to give some cherished system the appearance of support.

Ad hoc discarding of evidence underlies Rasnitsyn's dismissal of reduction characters (p. 138). Disregarding the reduction to 10 antennal segments and loss of the hindwing 1A vein, as well as equivocating on behavior, Rasnitsyn argues that four characters support his placement of Embolemidae, whereas only two support mine (as sister-group of Dryinidae)! Obviously, if the reduction characters are not disregarded and behavior treated correctly the count favors the placement with Dryinidae. The validity of this attitude toward reduction characters is perhaps best appreciated by considering loss of wings in fleas - does anyone wish to maintain that each species of flea lost its wings separately? The strength of evidence is not measured by whether a character is a reduction, but by whether it is unique and how many other characters accord with it. The reduction to 10 antennal segments is probably the strongest character bearing on the placement of Embolemidae, because of its restricted distribution in Hymenoptera. The fusion of the furcula and valvulae, grouping sclerogibbids, embolemids and dryinids, is almost as strong, again because of its singularity. These characters accord both with other loss features (hindwing 1A in dryinids and embolemids, erroneously stated by Rasnitsyn to be absent in Scolebythidae) - and the similar behavior of embolemids and dryinids.

Regarding behavior, Rasnitsyn includes "larva developing externally on active host" as one of the four characters he opposes to my system, grouping dryinids and sclerogibbids without embolemids - but if anything this plainly groups all three taxa (disregarding that external development is primitive!). Rasnitsyn argues (p. 139) that "Biological observations on Embolemids are confusing. The description by Bridwell (1956 [actually 1958]) can be understood as indicating the larva developed endoparasitically, while R. A. Wharton (in litt., 1986) observed the larva enclosed in an external sac." This confusion perhaps stems from a lack of familiarity with English. Bridwell himself (1958, **Proc. Ent. Soc. Wash.** 60:24-5) specifically characterized embolemid behavior as "in all essential particulars a dryinid biology", described the larval protrusion as "a translucent, rounded mass under the wing pad, which increased in size", and compared it with Dryinidae as follows: "similarly in other Dryinidae the egg is inserted within the body of the prey and the resulting larva emerges into a larval sac beneath the wingpad". Wharton (1989, **Proc. Ent. Soc. Wash.** 91:509-512) independently corroborates Bridwell's account.

As for Rasnitsyn's remaining three characters, in my 1986 paper I pointed out that the metasternum and metasomal sterna I and II articulations were not in fact similar in embolemids, bethylids and chrysidids. Rasnitsyn advances no arguments for the homology of the different states in these taxa. That leaves just the supposed similarity in metasomal sternum II in dryinids and sclerogibbids, which I did not comment upon in 1986. Rasnitsyn's own figures (1980:159) show little similarity in these two families, and little difference from plumariids and scolebythids.

From all of this, it is clear that the weight of evidence favors my 1986 system. However, Rasnitsyn is correct on one point: two midtibial spurs are present in various embolemids, and so reduction to one cannot be a synapomorphy with dryinids. Also, as mentioned by Rasnitsyn, and depicted in my 1986 fig. 16 but not discussed on p. 312, SC+R+RS is elongate in Embolemidae, possibly secondarily. For further discussion on cladistics see **Sphecos** 14 and 16. The rest of this note briefly treats the remaining points of disagreement.

1. Rasnitsyn (1988) pays more attention to wing venation than in his 1980 work, but his treatment is not parsimonious. For example, he treats the forewing RS2 as a secondary vein, and does not follow the straightforward interpretation of loss of the third discoidal and third submarginal cells by loss of m-cu2 and r-m3. There is room for disagreement about venation reduction, of course, but Rasnitsyn then has to posit secondary reappearance of the crossveins. He also follows Mason (1986, **Proc. Ent. Soc. Wash.** 88: 1-7) in mentioning an "adventitious" vein in front of the cubital furrow closing the second discoidal cell; movement of the cubital furrow onto the A vein seems more likely.

2. Rasnitsyn (p. 138) states that "Contrary to Carpenter (1986), a prosternum upcurved before forecoxa and thus partly invisible externally, is universal for hymenopterans beginning with Xyelidae." This misconstrues my interpretation of the primitive state, which is that of Brothers (1975, **Univ. Kansas Sci. Bull.** 50:505, fig. 16), wherein the prosternum may be sunken for a "very short posterior section". The degree of invagination is what is at issue.

3. Rasnitsyn (p. 138) states that "Contrary to Carpenter (1986), the dryinid ground plan includes long metapostnotum with a clear hind margin (cf. Olmi, 1984, Figs. 2, 397, 401, etc.)". He also states this is the case for embolemids. However, the figures Rasnitsyn cites show nothing of the sort; the only "clear" hind margin is that of the **metanotum**. Possibly Rasnitsyn has confused the surface

sculpturing of some dryinids (adjacent, almost foveate rugae; Olmi, 1984, **Mem. Amer. Ent. Inst.** 37: Fig. 401) with the metapostnotum. This in no way resembles the primitive state, seen in plumariids.

4. Rasnitsyn suggests that geniculate antennae and the chelate female foreleg of some drinids are groundplan characters, and their absence is secondary. However, primitive absence is the parsimonious interpretation for both (Carpenter, 1986), considering the outgroups. Rasnitsyn's reasoning is based on early Cretaceous fossils with geniculate antennae and chelate legs. This merely highlights the deficiencies of the fossil record in phylogenetic analysis. For the inference that the earliest fossils always show the primitive state to hold, complete sampling has to be assumed - that is, that there were no unfossilized taxa showing a more primitive state. Such an assumption is patently false, and so fossils are really just further taxa to be analyzed, which have the disadvantage of poor preservation. The central place of paleontology in phylogenetic inference during the past 50 years has simply been due to the absence of reliable methods applicable to extant taxa, but the development of cladistics has changed all that. This development is now beginning to penetrate paleontology (e.g., Schoch, 1986, **Phylogenetic reconstruction in paleontology**), which can only be welcomed.

On Brother's aculeate phylogeny

by

James M. Carpenter

Justin Schmidt (**Sphecos** 17:12) asks for opinions on Brothers' (1975, **Univ. Kansas Sci. Bull.** 50) analysis of the families of Aculeata; Tom Piek (**Sphecos** 8:6) provides some, suggesting that the Tiphiidae is the sister-group of Scoliidae+Vespidae, and requests reaction to this. My purpose here is to point out that this placement is ill-founded.

Questions have been raised about one detail or another of Brothers' paper by Königsmann (1978, **Dts. Ent. Z.** 25), who had Bradynobaenidae as sister-group to ants; Rasnitsyn (1980, **Trans. Paleont. Inst. Acad. Sci. US.S.R.** 174; 1988, **Orient. Ins.** 22), who challenged the monophyly of Vespoidea s.l., argued for monophyly of the traditional taxon Scolioidea and suggested Formicidae as the sister-group of Vespidae; Osten (1982, **Stutt. Beitr. Naturk.** 354), who argued for relationship of Scoliidae to part of Scolioidea; Gibson (1985, **Can. Ent.** 117), who showed that the immobile prothorax must have arisen independently in scoliids and vespids, and so eliminated a strong synapomorphy; and Day (1988, **Handbk. Ident. Br. Ins.** 6), who questioned the placement of Rhopalosomatidae. Only Rasnitsyn attempted a comprehensive re-evaluation of all of Brothers' characters; his analysis is deficient in that he did not use cladistic methods (see Rasnitsyn on Chrysidoidea, or what is a cladist really? on page 7 of this thrill-packed issue). Nevertheless, Rasnitsyn did adduce some new characters, and together these papers indicate that a comprehensive reanalysis is desirable.

Piek's contribution is the wrongway to go about doing this. He characterizes his scheme as "Based on Brothers' classification", but in fact he disregarded nearly all of Brothers' characters. Piek's evidence consists only of saying that Tiphiidae share with Scoliidae the features of "behaviour, egg deposition, and venom composition in particular", and "many tiphiids look like scoliids". About the latter, I am appalled that, decades after Hennig, anyone would advance mere resemblance as an argument for phylogenetic relationship. To belabor the obvious, such resemblance could be primitive - which, by the way, is just how Brothers polarized behavior and egg deposition in tiphiids and scoliids. This is all just confusion anyway, since Piek apparently doesn't realize that his scheme actually requires the interpretation of plesiomorphy in all these features for tiphiids and scoliids, for it has Vespidae as the sister-group of Scoliidae. The only substance in the scheme is the possession of kinins in the venom as a synapomorphy for Formicidae, Tiphiidae, Scoliidae and Vespidae. But this is just one trait - Brothers considered 92 characters, many of them multistate. So the question now is, just how many of these would have to be dismissed to support Piek's scheme? The simplest way of answering this question is to map Brothers' synapomorphies onto his cladogram (Brothers' fig. 2). I get an answer of about 17 to move tiphiids to sister group of Scoliidae+Vespidae. *Ceteris paribus*, the hypothesis supported by 17 characters is preferable to an alternative supported by just 1.

The right way to go about a reanalysis is to re-do Brothers' study, with improved interpretations of the characters he used, more exemplars, and more characters. And the way to begin such a study is with a reexamination of Brothers' cladogram. Namely, how well supported is it? Fit statistics, such as consistency index, were not presented for the tree, but considerable homoplasy is indicated by the character discussions. Brothers indicated that the tree was produced after multiple runs with a computerized cladistic algorithm, as well as mental analyses, and further that the tree is based on only part of the character set. However, the computer programs available at that time were vastly inferior in their ability to find optimal trees for homoplastic data sets compared to those available today, which incorporate numerous advances in techniques for finding shortest trees made since 1978. I have recently reanalyzed Brothers' data set using the best of these programs, Hennig 86 (see Platnick, 1989, **Cladistics** 5:145-161), thought fellow sphecologists would be interested in a summary of the results.

What I have done first is to recode Brothers' characters, with the technique of nonredundant linear coding (see O'Grady & Deets, 1987, **Syst. Zool.** 36: 268-279). This allows Brothers' character state trees to be expressed efficiently as linear numerical variables, so the program does the analysis **using his interpretations**. As noted above, some of these should be changed, but my purpose here is to see how well Brothers' tree is supported by his interpretations. This recoding produced a matrix of 162 variables for the 5 taxa Brothers treated. An all-plesiomorphic taxon was included as an ancestor to root the tree.

I did two analyses. The first included all 162 variables. Searching for multiple trees with extended branch swapping resulted in 28 cladograms (length 398, consistency index 0.52, retention index 0.64). The strict consensus tree is shown below (fig. 1); it includes just those groups found on each one of the 28 trees.

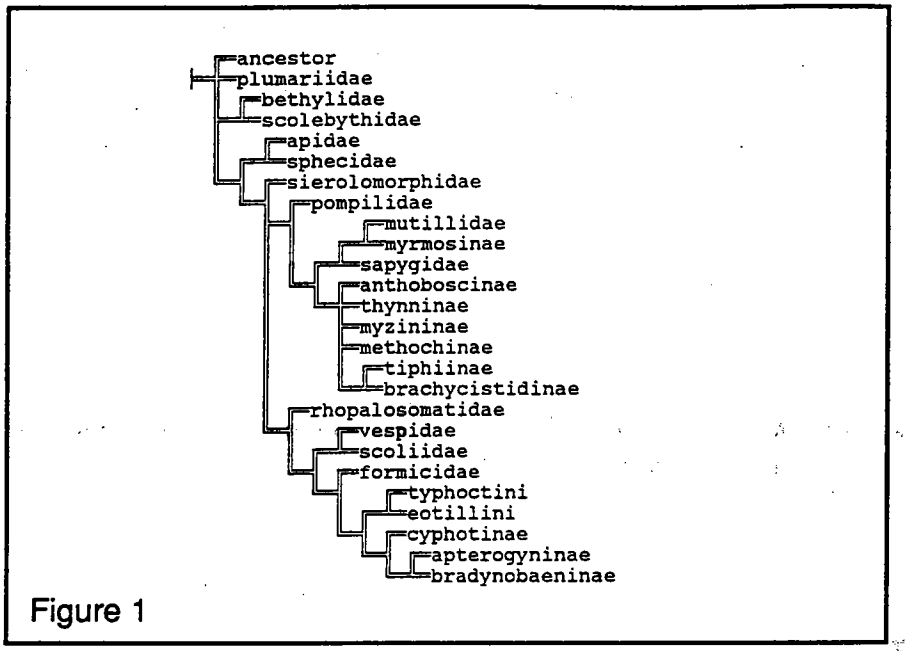


Figure 1

The deviations from Brothers' cladogram are: (1) Chrysidoidea is not a group, since Plumariidae is not part of it; (2) placement of Sierolomorphidae as most basal in Vespoidea; (3) placement of Pompilidae with Tiphiidae+(Sapygidae+Mutillidae) - looks like Mick Day may be correct about the rhopalosomatids!; (4) Tiphiidae is basally unresolved; and (5) Formicidae and Bradynobaenidae are sister-groups.

I next applied successive approximations character weighting, to see if the better characters more closely resembled Brothers' tree (see Carpenter, 1988, **Cladistics** 4: 291-296). This reduced the number of trees to two. These differed from each other only in whether Plumariidae was in Chrysidoidea or sister-group to Aculeata *s.str.* They agreed in resolving Tiphiidae as in Brothers' cladogram, the only point of difference between them and the consensus tree presented above.

The second analysis included just those characters marked with an asterisk in Brothers' paper; these were the ones used in construction of his final cladogram. This resulted in two trees (length 135, consistency index 0.72, retention index 0.80). Successive approximations selected the one shown below (fig. 2).

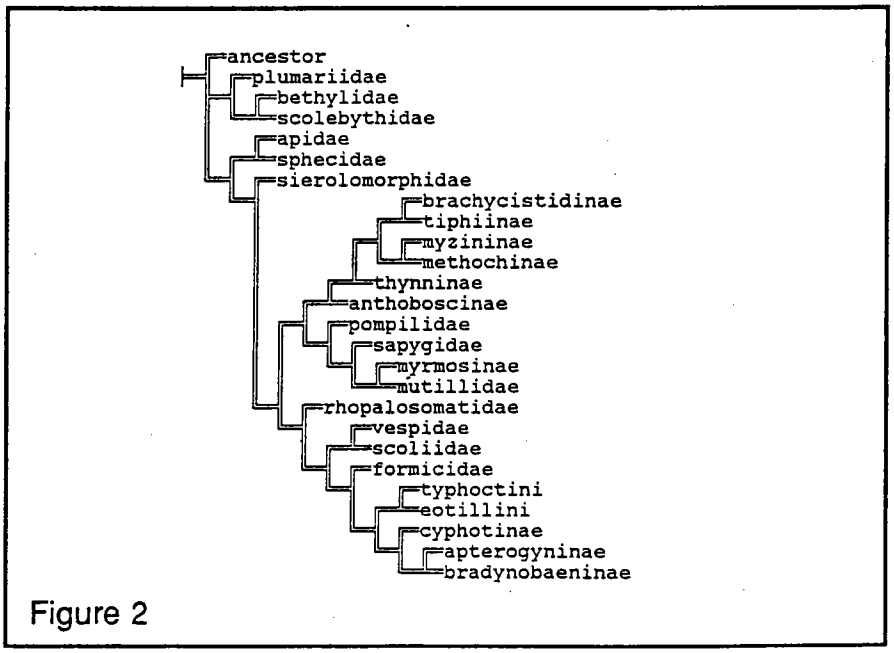


Figure 2

This differs from the results with the complete data set (fig. 1) in that Chrysidoidea is now a group and Tiphiidae is resolved without weighting - but Pompilidae is sister-group to Sapygidae+Mutillidae!

So a straightforward high-tech treatment of Brothers' own data supports most, but not quite all of his hypothesis. It is unclear how much significance to attach to this. Fitting the recoded data to Brothers' cladogram assigns lengths of 404 for the entire matrix and 135 for the reduced character set, not large differences from the most parsimonious trees. Brothers' analyses proceeded until the results from his mental and computer runs were "highly similar or identical"(?) From his discussion of the characters it appears that there was some form of weighting employed. This was not made explicit; Brothers (*in litt.*) informs me that a kind of best-fit weighting was performed in some analyses, so it was not entirely intuitive. I have not had time to investigate what sort of weights would need to be specified for Brothers' tree to result from reanalysis. I intend to pursue this at a later date, as part of a comprehensive reanalysis of aculeate interrelationships.

Apomorphic Character distributions in Brothers' aculeate study

by
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Like many others, I was impressed by Brothers' analysis (1975, **Univ. Kansas Sci. Bull.** 50) but frustrated by the lack of an explicit presentation of how his cladogram was supported by characters. I started going through his character discussions and mapping the characters on the cladogram but quickly found excuses to do more interesting things (like Ichneumonids) after about character 20. The project languished at this stage for many years, but I was stimulated to finish by Piek's suggestion about Tiphiidae (**Sphecos** 18:6), and the treatment of Vespoidea in Gauld and Bolton's **The Hymenoptera** (1988. Oxford Univ. and British Museum (Nat. Hist)). In the latter, it was stated that the Vespoidea *sensu* Brothers lacks apomorphies and is thus paraphyletic. This

may be, but an explicit refutation of Brothers' vespoid autapomorphies (internode 4-6, below) should have been given to support this bald statement.

What follows is a list of apomorphies placed on the internodes of Brothers' cladogram (his fig. 2) as indicated in his character discussions. Reversals are indicated, and states restricted to one sex are so noted. His "Bethyloidea" and "Sphecoidea" are Chrysidoidea and Apoidea, respectively (Carpenter, 1986, **J. New York Ent. Soc.** 94:303-330; Gauld & Bolton, *op. cit.*). I have taken liberty to refer to his "Apiformes" as Apidae, and "Spheciformes" as Sphecidae. Brothers marked certain characters with an asterisk to signify those he considered to be most useful in contructing his final cladograms. These are: 1, 6, 11, 12, 14, 18, 19, 21, 23, 24, 25, 26, 28, 29, 30, 31, 35, 40, 45, 46, 51, 53, 56, 60, 68, 69, 70, 71, 74, 75, 78, 79, 83, 86, 88.

Pending a comprehensive reanalysis of aculeate relationships, future workers should try the novel approach of addressing Brothers' data before making cavalier statements about relationships.

In the following list of apomorphies, the numbers at the left margin are the branching points (circles) on Brothers' cladogram (fig. 2). The numbers indented beneath them are the apomorphic character states from Brothers' paper that support their internodes.

1-2 (Chrysidoidea)
42.1; 45.1; 46.1; 51. 2; 56.2; 79.1
Plumariidae
2.1; 7.3 (female); 9.3 (female); 10.1 (female); 13.1 (female); 16.1 (female); 17.1 (female & some males); 18.1 (male); 20.1 (female); 24.2 (female); 25.1; 27.1 (male); 38.1; 38.1.1 (male); 51.2; 56.2; 57.1 (female); 59.1 (female); 61.1; 61.1.1 (female); 62.1; 69.4; 80.1; 82.1
2-3
35.2; 46.1.1; 49.1
Scolebythidae
5.1; 7.3; 9.1; 20.1; 26.2; 34.2; 46.1.1.1; 49.1.1; 50.3.1; 57.2 (male & female); 61.2; 62.2
Bethylidae
17.1 ; 50.3
1-4
12.1; 25.1; 26.1; 61.1; 62.1; 78.1
4-5 (Apoidea)
18.2; 21.2; 22.1; 23.2; 27.1; 29.2; 31.2; 33.1; 35.3; 36.3; 39.1; 47.1; 64.1.1; 81.2; 90.1
Apidae
4.1; 5.2; 15.1; 30.2; 42.1; 45.1; 51.1; 63.1; 78.1.1; 82.1.1; 84.2; 85.1; 87.2; 89.1; 90.1.1; 92.1
Sphecidae
21.2.1; 61.1.1; 62.1.1
4-6 (Vespoidea)
24.1; 29.1; 38.1; 51.2; 56.1
6-15
22.1; 38.1.1; 55.1
Sierolomorphidae
9.1; 31.1; 36.2; 42.1; 45.1; 46.2; 49.1; 50.1; 56.2; 66.1; 83.1; 84.2
15-16
47.1; 54.1; 87.1
16-17
31.1; 32.1; 36.2; 48.1; 50.1; 68.1; 82.1
Pompilidae
29.1.2; 33.1; 61.1.1; 62.1.1; 64.1; 80.1; 88.1; 90.1.3;
Rhopalosomatidae
9.1;18.1; 21.1; 27.1; 29.1.1; 31.1.1; 45.1; 46.1; 49.1; 55.0 (reversal); 57.3 (female); 72.1; 81.2; 87.3

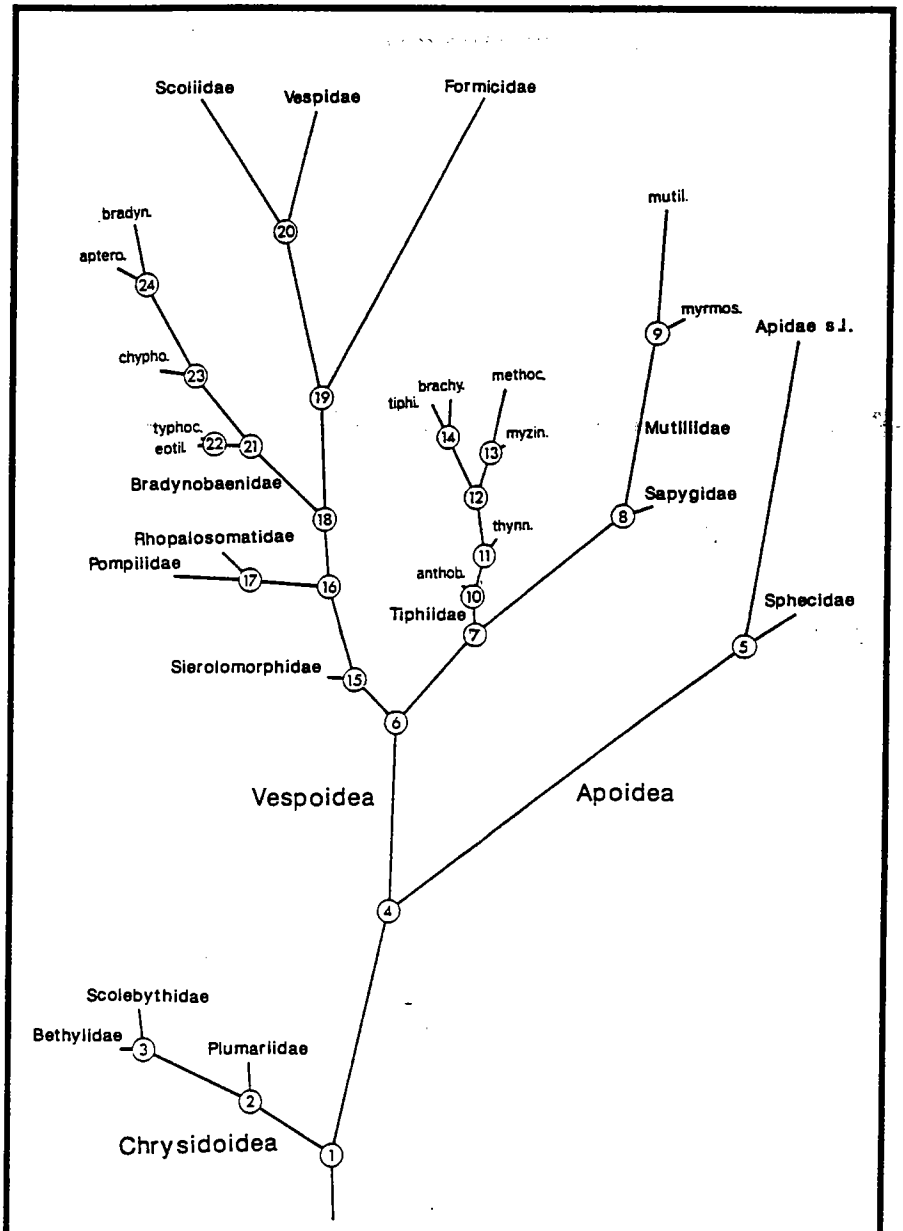
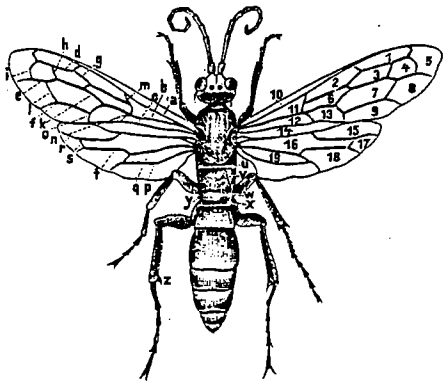


Fig. 2 from Brothers, 1975. His cladogram of 25 taxa of Aculeata is based on 92 characters in his paper. He did not include most families of Chrysidoidea here, but see his figure 67 for them. Superfamily names accepted by Brothers have been added, and family names spelled out.

16-18
29.1.1; 33.1; 35.1.1; 76.1
18-21 (Bradynobaenidae)
2.1; 6.2; 9.1; 10.1 (female); 30.2; 38.1 (reversal from 38.1.1); 39.1; 40.1; 42.1; 45.1; 49.1; 55.1.1; 69.3; 70.2; 71.2; 72.1 (male & female); 73.1; 74.1; 81.2; 82.1
21-22 (Typhoctinae)
4.1; 22.0 (reversal); 36.2; 66.1; 69.3.1; 80.1
Eotillini
47.0 (reversal); 50.1; 55.0 (reversal); 58.1 (male & female)
Typhoctini
56.2; 61.1.1; 62.1.1
21-23
6.1; 7.1; 9.3 (female); 13.1; 18.1 (male); 23.1; 27.1 (male); 36.1; 57.1 (female); 58.1 (female); 61.1.1; 62.1.1.1; 64.1 (female); 69.3.2; 74.1.1; 75.1; 83.4
Chyphotinae
8.1; 33.1.1; 47.0 (reversal); 50.1; 66.1 (male); 75.1.1 (female); 80.1; 84.1
23-24
9.3 (male); 11.1; 28.1; 32.2 (female); 34.1; 40.1.1; 45.1.1; 46.5; 47.1.1; 49.1.1; 54.2; 58.1 (male); 60.1; 61.1.1.1; 64.1.2; 70.2.1 (female); 71.0 (reversal); 85.1
Apterogyninae
5.2 (male); 8.1; 66.1; 72.1.1; 77.1
Bradynobaeninae
15.4; 16.2; 17.1; 21.3; 28.1.1; 36.1.1; 43.1; 44.1; 46.5.1; 50.2; 59.1; 60.1.1; 61.1.1.1.1; 62.1.1.1.1; 63.2; 64.1.2.1 (male); 64.1.2.1.1 (female); 80.1; 81.1; 83.4.1
18-19
18.1; 21.1; 23.1; 27.1; 36.1; 54.2; 90.1
Formicidae
3.1; 9.1; 29.1.1.3; 30.2; 33.1.1; 37.1; 46.1; 50.1; 61.1.1.1; 62.1.1.1; 65.1; 68.3; 72.1; 73.1; 75.1; 81.2; 89.1; 90.1.2; 91.1
19-20
5.2; 7.2; 15.2; 19.1; 21.1.1; 25.1.1; 31.2; 48.1; 85.1
Scoliidae
9.3; 29.1.1.2; 30.1; 32.2 (male & female); 36.1.2; 38.1.1.2; 39.1; 41.1; 42.1; 44.1; 45.1; 49.1; 55.1.1; 57.1 (female); 59.1; 60.2; 61.1.2; 62.1.2; 63.1; 64.1; 72.1; 83.2; 84.2
Vespidae
21.1.1.1; 29.1.1.1; 32.1; 43.1; 68.2; 80.1; 82.1; 89.1; 90.1.1; 91.1
6-7
31.1; 35.1; 52.1; 61.1.1; 62.1.1; 64.1 (female); 82.1; 88.1
7-10 (Tiphiidae)
31.1.1; 57.1 (female)
Anthoboscinae
45.1 (female); 84.1
10-11
69.1
Thynninae
2.1; 55.1; 66.1
11-12
69.1.1; 72.1 (male); 76.1; 83.3
12-13
1.1; 6.2; 82.0 (reversal from 82.1)
Myzininae
35.1.1
Methochinae
2.1; 7.3; 9.2; 22.1; 31.1 (reversal from 31.1.1); 42.1; 46.3; 50.1; 57.0 (reversal); 61.1 (reversal from 61.1.1); 63.1 (female); 65.2 (female); 66.1 (male); 67.1; 68.4; 81.1
12-14
21.1; 22.1; 33.1; 36.1.1; 42.1; 44.1; 45.1; 49.1; 66.1; 72.1 (female); 81.1; 82.1.1; 84.2; 85.1
Tiphiinae
35.1.1; 42.1.1; 46.4
Brachycistidinae
2.1; 5.1 (female); 7.3 (female); 8.1; 9.1 (male); 9.3 (female); 10.1 (female); 18.1 (male); 27.1 (male); 29.1.1; 54.2; 59.1; 63.1
7-8
6.1; 29.1.2; 38.1.1; 50.1; 53.1; 55.1; 56.1; 64.1.1 (female); 66.1; 72.1 (male); 86.2; 90.2
Sapygidae
15.3; 80.1; 87.2
8-9 (Mutillidae)
2.1; 13.1; 14.1; 18.1; 29.1.2.1; 32.1; 36.1; 42.1.1; 54.1; 69.2; 71.1; 72.1 (male); 76.1; 81.1
Myrmosinae
9.2; 58.1 (female); 59.1 (female); 66.1.1; 69.2.1; 82.0 (reversal); 84.2
Mutillinae and other subfamilies
21.1; 29.1.2.1; 30.1; 34.1; 38.1.1.1; 45.1; 49.1; 69.2.2; 70.1



Pepsis plutus Erichson

BOOK REVIEWS

Spider Wasps. Hymenoptera: Pompilidae. - M. C. Day 1988. *Handbooks for the Identification of British Insects* 6(4). Royal Entomological Society of London, London. 60 pp.

The series of **Handbooks for the Identification of British Insects** are intended to provide identification keys to the insects of Britain, together with short synopses of morphology and biology. Yet the publications are frequently of much more general interest. A good example is Richards (1977), which for years was the closest thing to a standard introduction to the order Hymenoptera, and is still the most comprehensive general treatment of hymenopteran morphology. Other handbooks have contained world keys (e.g. Morgan, 1984) or important taxonomic actions. This handbook also transcends the regional aims of the series. In addition to the authoritative treatment of the British spider wasp fauna there is an important contribution to the study of hymenopteran wing venation, and critical remarks on the phylogenetic relationships of the Pompilidae and Rhopalosomatidae.

Wing venation is a major source of characters within Hymenoptera, but several different systems of vein and cell nomenclature have been in use. Day's system is based on Wootton's (1978) study of homology across insect orders, and pay's particular attention to the relatively neglected wing folds. He also compares his previous terminology (Day, 1984) for stages in reduction of veins with that developed by Mason (1986), showing that they are complementary. These innovations are combined in a system which should be generally applicable across Apocrita, and should be followed. Particularly useful here is the table comparing systems (on pages 55-58); it is the most exhaustive I have seen, including separate listings for each abscissa (segment) of each vein.

The other significant aspect to this work is the section on affinities. Brothers (1975) treated Pompilidae and Rhopalosomatidae as sister-groups. and placed this clade within his expanded Vespoidea, which included most of the non-chrysidoid aculeate families. Rasnitsyn (1980) questioned

this, suggesting a sister-group relationship of Pompilidae+Rhopalosomatidae with Apoidea (i.e. Sphecidae+Apidae). Although Rasnitsyn did not consistently employ cladistic methods, he adduced nine characters as evidence for this relationship. Of these, six were symplesiomorphies, and another (the hind limb cleaning apparatus) was not of the same form among these taxa. In Rasnitsyn (1988) just two are cited: enlarged pronotal lobes, and the prey "other than cryptobiotic larva of Holometabola". By that last, spiders, the cricket hosts of rhopalostomatids and the diverse prey of sphecids are the same character! As for pronotal lobes they are enlarged in other groups (e.g. scoliids). Day unfortunately does not comment on Rasnitsyn's suggestions (for critiques of other parts of Rasnitsyn's system, see Gibson, 1975; Carpenter, 1986). Indeed, he comes to no firm conclusions regarding placement of Pompilidae and Rhopalosomatidae - he is more concerned with arguing that they are not sister-groups. He does not do this by the strongest means, namely showing that one of these taxa is sister-group of a third. Rather, he attacks the interpretation of the characters supposed to be synapomorphic between these two families, and cites six of rhopalosomatids which are said to "parallel those of the vespid (*s.str.*) branch". The arguments on the three putative synapomorphies of rhopalosomatids+pompilids are not quite decisive: he documents differences between the two taxa, but these do not by themselves rule out the conditions being part of the same transformation series. As for the characters shared by rhopalosomatids and vespids they are mostly not shared uniquely (emarginate eyes, trochantellus, ventrally produced pronotum, marked articulation between abdominal segments I and II) or it is unclear whether they are groundplan features (form of propodeal-metasomal articulation, exposed thyridium). Nevertheless, his remarks are highly suggestive, and combine with a growing chorus of questions concerning Brothers' system (Königsmann, 1978; Rasnitsyn, 1980, 1988; Osten, 1982; Gibson, 1985; but see Piek, 1987) to indicate that a comprehensive reanalysis of the interrelationships of the families of Aculeata *s.str.* is called for.

In addition to these major points, consideration of some other aspects of morphology includes some noteworthy remarks. For example, Day points out that the condition of the meso-metapleural suture varies more than shown by the exemplar species studied by Brothers. The discussion of pompilid biology is a useful summary, as is the amusing section on collecting techniques.

This handbook will be a helpful reference, particularly on wing venation.

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Rovarbölcsök. - László Móczár. 1987. Budapest: Gondolat. 187 pp.

This very attractive book, titled **Insect Nurseries**, opens with a chapter on the generalized condition in which the mother insect takes no special brood-care measures. The other nine chapters are a semipopular exposition of the various means by which some insects depart from this condition to provide their offspring with a protected environment. The emphasis is on aculeate wasps and bees.

While this is not as ambitious a work as Karl von Frisch's **Animal Architecture** (1974) or Mike Hansell's **Animal Architecture and Building Behaviour** (1984), it invites comparison in one respect. Each is a survey of the ways a variety of animals undertake a particular sort of task, and each gives considerable attention to the nesting of wasps and bees. However, Frisch's and Hansell's books have to do with the physical constructs, while Móczár is mainly concerned with brood-care.

The book is illustrated with 177 photographs of insects in their natural environment. These appear mostly to be the central European species with which Móczár has extensive personal experience. **Insect Nurseries** is in all respects a fine physical product. For most of us it is necessarily a picture book, and I should note that the photographs are excellent and mostly in color. It is a pleasure to see a book of this type so well produced.

The book is not easily available through normal distribution. If you would like a copy, write to Chris Starr.

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The Social Wasps of India and the Adjacent Countries - Bina Pani Das and Virendra H. Gupta. 1989. *Oriental Insects Monograph* No. 11, Gainesville, Florida. 292 pp.

There's good news and there's bad news. The good news is that the long-neglected social wasps of the Indian subcontinent are no longer neglected; they are treated here in a quite nicely done-up book that would appear to be worth the $55.00.

The bad news is that the old saying about books and their covers is well worth heeding. Which means: I get to make like a grumpy curmudgeon (for a change).

Before going further I must comment on a problem that cannot be laid on the authors. For both authors English is a second language and it shows, for the phrasing is often awkward. Since this book was published in the U.S., I believe that the editor of **Oriental Insects Monographs** is seriously at fault. Any editor worth his salt would have worked with the authors to smooth out the many problems in grammar, an especially important deficiency in some of the keys and descriptions. Also, there is no evidence that this was submitted for peer review; some of the difficulties noted below might have been avoided if it had been reviewed.

The book is divided into the usual parts (Introduction, Materials and Methods, etc), with separate chapters for the various subfamilies/tribes. All the introductory stuff is pretty routine, but it appears (p. 2) that very little material from collections outside of India was utilized in this study, despite the statement that specimens from "personal collections of many workers in Europe and Japan" were studied. A quick perusal of "specimens examined" under various species strongly suggests that few specimens from other collections were seen. Since there are no acknowledgments beyond correspondence (a total of five individuals!) I wonder about the "many workers". So much for that little quibble. Implicit in the above is that a wealth of material in major institutional collections was not examined. This egregious oversight is difficult to comprehend. Especially incomprehensible is that the authors appear not to have studied relevant type material. All too often we read that "specimens of this [taxon] were not available for study".

I will decline to comment on their treatment of the Stenogastrinae, a group about which I know enough to know I don't know enough.

On the Polistinae, genus *Polistes*. We'd have been much better off without the key to the "subgenera" of *Polistes*, especially since females present an insurmountable problem at couplet 2. Even the key by Richards (1973) works better than this one.

Major gripe. *Polistes gallicus*: which *P. gallicus*? Since the authors chose to ignore the controversial name corrections proposed by Day (1979), the unwary or ignorant (i.e., uninformed) may not be aware that there is a problem here.

The *Polistes* keys, in general, don't work at all well; too many "more or less" statements that are meaningless and some down-right erroneous characterizations (*P. sagittarium* (sic!) does have a "ribbed" pronotum, though the ridges are not as strong as in *P. strigosus*.

Ropalidia is the largest genus of social wasps in the Indian region. The key to species (pp. 110-113) is better than no key, I suppose, but one wishes that character states had been more clearly described. Again, too much of the "more or less" stuff. The result is that many of my unidentified Indian *Ropalidia* remain unidentifiable with this key.

The key to *Vespa* species seems to work well enough in most cases, but clearly does not work for "*Vespa mandarinia soror*" because the gena is not more than twice as wide as the eye in profile nor are the ocelli more than "3.0x further from occiput than from eye". The authors note that Jacobson cited these problems and suggested *soror* should be treated as a distinct species: they gave no justification for failing to do so.

The above are cited as some of the many problems to be encountered with this book. Another problem is less tractable. I am frankly amazed that in a treatment purporting to deal more or less critically with so many taxa (12 genera, ca 135 species and subspecies) there is not a single new synonymy proposed. There are quite a few new species and subspecies described, however. Nearly all the subspecies recognized in this work are characterized by color differences, but there is no discussion of color variation nor is there any obvious effort to determine whether or not any of this variation is clinal. At a time when the concept of the "geographical subspecies" based on very limited collections is increasingly suspect, this seems suspiciously like an advance to the rear, a failed opportunity for an advance. But we have instead an uncritical acceptance of all the outmoded work of the past. Pity.

The book is profusely illustrated, but the authors borrowed very heavily from previously published figures with the result that quality is very uneven; some are downright bad, especially the *Belonogaster juncea* figures reproduced from Richards (1982). Original figures are mostly good (though some are poor) and often do not appear to be especially relevant; the genitalic figures are mostly too small and are often short on detail (e.g., 29c).

The distribution of every species (and "subspecies") is shown on a set of maps. However, one can look at the distribution of *Parapolybia varia* (p. 192) and wonder at the apparent disjunctions shown. Is this an artifact of collecting, an erroneous record, or an accidental introduction into Bombay?

Concluding, I do have to say that this book will prove useful to anyone involved in Indian social wasps, though I suspect it will lead to misidentifications by individuals who are not already well-versed in vespid systematics, most particularly in the genera *Polistes* and *Ropalidia* (unfortunately that covers most of the species).

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Economic Insect fauna of China. Part 30. Hymenoptera: Vespoidea. - Lee Tie-sheng. 1985. Beijing: Science Press. 159 pp. (In Chinese).

Since 1980, T.S. Lee (or Li) has written a number of papers, mostly short checklists, on the vespids of China. His geographic emphasis is evidently the provinces of Yunnan and Sichuan. I am told that the present work is mainly an expansion of his 1982 book-length treatment of vespids from agricultural regions, which I have not seen. To judge just by this book and the fact that it is volume 30, the Academia Sinica appears to have undertaken a project somewhat like the Canadian government's **The Insects and Arachnids of Canada** handbook series.

After an opening overview chapter on the habits, economic significance, management and anatomy of vespids, the bulk of the book is devoted to the description and keying of 150 species and subspecies. These comprise 79 eumenines, 33 polistines, 34 vespines and four stenogastrines. The table of contents serves as a convenient species list. The line figures are sparse, but an especially attractive feature is the 12 color plates at the end. Ten of these are given over to painted dorsal views (legs removed) of all of the wasps treated. The other two plates show various scenes from life, mostly of nesting and foraging. For those of us who read Chinese with difficulty or not at all, these plates and the species list are the most useful features.

Lee's nomenclature is not entirely up-to-date, and his classification is not one of the standards. He elevates to family status groups which most of us would treat as subfamilies or even tribes, and his placement of species in genera is occasioinally heterodox. In my view, this is a very small problem or none at all, as the nomenclture and classification are properly documented.

The book ends with indices to common and scientific names. As near as I can tell, the common names are mostly formulated by Lee himself. These are mostly fairly literal renditions of the scientific names, similar to German common names. *Vespa basalis*, for example, is the "basal hornet", and the stenogastrines become the "slender abdomened vespids". There is something to be said for such close matching, although my own preference is for common names to follow quite different rules, with appropriateness taking precedence over precision and stability.

I regret thiat I have no price or distribution Information.

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The Hymenoptera. - Edited by Ian Gauld and Barry Bolton with contributions by Gauld, Bolton, T. Huddleston, M.G. Fitton, M.R. Shaw, J.S. Noyes, M.C. Day, G.R. Else, N.D.M. Fergusson and S.L. Ward. 1988. British Museum (Nat.Hist.), London. 332 p. 35£).

I have finally got my hands on a copy of this long awaited book and it is an impressive tome. It is divided into a broad spectrum of chapters that cover biology, economic importance, collecting and storage, adult and immature morphology, classification and systematics, evolution, a key to superfamilies occuring in Britain, and finally overview treatments of the Symphyta, Parasitica and Aculeata including keys to families and individual family writeups. These overviews make up two thirds of the book. Included is an up-to-date terminal bibliography that is referenced throughout the text to document each chapter's presentation. Responsibilities of the various authors is not given unfortunately, but one can assume that Mick Day wrote the treatment of the Pompilidae and Nigel Fergusson the section on Cynipoidea.

This book is designed to cover the fauna of the British Isles, but as the editors point out, it is generally applicable to western Europe and to a lesser extent the Holarctic Region. In spite of this regional approach, The Hymenoptera is a modern, up-to-date synthesis of the order and it includes much that is of general usefulness to a hymenopterist working anywhere in the world. This is particularly true of the chapters on biology, collecting and preservation, morphology, and evolution, where the subject matter is quite basic. Many fine illustrations are scattered through the book including 8 pages of high quality color photographs depicting imature stages in particular but also some adults.

Not being particularly well versed in biology I found the chapter treating this subject enlightening. The word parasitoid is defined and used instead of the less appropriate word parasite, and each time a different biological term is used and explained it is highlighted in capital letters to make it stand out (ENDOPARASITOID, SYNOVIGENIC, etc.).

The chapter on mounting is generally ok but I personally find that gluing small wasps to the side of pin, a practice espoused here, is not too wonderful because viewing the dorsal and ventral parts of the thorax in particular can be difficult due to the proximity of the pin itself. The discussion of mounting small hymens on points ("card pointing" in their parlance) is flawed. The authors advise that the specimen should be glued by its thoracic venter to the tip of the point. But this makes viewing the venter of the thorax impossible or nearly so. When mounting a small wasp on a point, it should be glued to the right side of the thorax so that the left side, the dorsum and the venter are all visible. This is essentially how the authors indicate that specimens glued directly to pins should be mounted. Personal whimsy seems to have crept into the discussion on point vs. rectangular card mounting. I see no rational explanation for stating that chalcidoids "should be mounted directly onto card rectangles", while it is ok to mount cynipoids and proctotrupoids on points. The entire discussion on mounting could have been improved with the addition of illustrations. There are none.

I was glad to see a section on how to label insects, particularly the examples showing what should be included. However, insect labels should always include the name of the country! The first example simply states "NORTHANTS." (Northamptonshire, a county in England), while their second example gives the name of the country, AUSTRIA. These days taxonomy is global and material may be borrowed from all over the world. It is critical that labels include country names. Northants. may be meaningless to someone outside of England.

The section on morphology is excellent and, as in the biology section, each term is highlighted in capitol letters and

explained. Synonymous terms are often mentioned in parenthesis. Morphology is an area where personal preference has generated considerable duplicity of terms. The authors are to be congratulated for generally making rational choices. I quibble with their rather arbitrary subdivision of the occipital carina into a ventral part that they term the "genal carina". Better to simply call the entire thing the occipital carina. One can always describe the condition of it if necessary. The description of the antenna is somewhat flawed. The authors fail to note that the flagellum is actually a single segment subdivided into units (flagellomeres or antennomeres). They continue the incorrect use of the word "segment" to denote these subdivisions (see my diatribe on this subject in **Sphecos** 14:28 and **Chalcid Forum** 9:12-13), and also continue to use those quaint chalcidological things called the funicle, clavus, and "anelli". The last is incorrectly spelled. The diminutive of the Latin word annulus (=segment) is annellus; hence annelli is the correct spelling.

I was chagrined to see yet another team used for the thorax, i.e., "alitrunk" (a misnomer for female mutillids)! It is bad enough that we have the mesosoma/thorax wars (see **Sphecos** 12:3), but then I guess the Brits always have to do things differently. Alitrunk has been used primarily for the thorax of ants up to now - it should have stayed put! The authors apparently did not consult the rather extensive morphological discussion of the sphecid thorax in **Sphecid Wasps of the World**, and I think they should have, especially in reference to their remarks on pleural structure on pages 64-66. Many of the pleural structures that they discuss are not illustrated (epicnemial carina, epicnemium, prepectus, subalar pit, etc.), and because the usage of these and other terms is non-universal, it would have been helpful to know exactly what their terms refer to. The term "suture" is abused especially in the thoracic discussion. As Snodgrass has clarified (**Smithsonian Misc. Coll.** 146:1-48, 1963) most grooves should be called sulci. Their "pleural suture" is an example of correct usage. The metapleuron is subdivided in many Sphecidae contrary to their statement that it is undivided in "apocritans". Again they should have examined the Big Blue Book. Unfortunately (I think) the authors have continued O.W. Richards use of the nautical term "keel" for ridges and carinae on the thorax and elsewhere.

The wing terminology employed is based on the Comstock-Needham/ Ross system, and the recent work of Wootton (1978, **Syst. Ent.** 4:81-93) has been incorporated. Wing termonology will be familiar to most aculeate taxonomists, but lovers of "radial cell", "cubital cell" and so forth, will doubtless find fault. Hopefully they are in the minority of the user community (but see cell terminology proposed by Sharkey in **Ichnews** 11:2-12). Our current duplicity of wing terminology is unfortunate. It would be nice if all hymenopterists adopted the wing system used in **The Hymenoptera**, but that is like hoping for peace in Lebanon. One change in wing terminology adopted from Wootton's work is "claval lobe" for the anal lobe of the hindwing. Use of this term is in the realm of scientific progress through sound research, and I personally have no strong objection to it.

The small pads found apicoventrally on the tarsi of some Hymenoptera were termed plantulae by Bohart and Menke in **Sphecid Wasps of the World**. In **The Hymenoptera** they are called plantar lobes, but in any event they are not recorded as occurring in the Sphecidae, where in fact, they are fairly common.

Although Snodgrass (1963, see above) makes it clear that tergum and sternum are the proper words forthe major abdominal plates, the authors of **The Hymenoptera** continue the common error of tergite and sternite, although not consistantly. For example, on page 241 in the description of the Pompilidae, the terms terga and sterna are used correctly. "Laterotergite" and "-sternite" are correct, however, since they are parts of the respective terga and sterna.

The authors avoid the term metasoma by calling the apparent abdomen the gaster, but they then insist on calling the first gastral segment, segment 2! That is confusing to say the least, and inconsistent also, because on their figures 7 and 8 they use tergite 1 and sternite 1 for the first gastral segment. Oh well. On page 74 the authors find it necessary to indicate in parenthesis that abdominal segments 2-8 means "1-7 of gaster"! This would have been avoided if they simply called the first gastral segment 1. People who do these kind of things never think of the user! I was amused and pleasantly surprised to see that my tongue-in-cheek term, **"Day's Organ"**, proposed in **Sphecos** 6:5, is now established (p. 74), although the origin of the name was not mentioned by the editors.

In the discussion of larvae, the omission of any mention of the important papers of Evans on the Sphecidae, and the ordinal treatment edited by Evans that appeared in Stehr's 1987 book on immature stages, is unfortunate. Perhaps the last appeared too late for inclusion, but papers published as late as 1988 are in the book.

The classification presented in Chapter 6 is noteworthy from an aculeate point of view since the authors follow Brothers 1975 in recognizing only three superfamilies: Chrysidoidea, Vespoidea and Apoidea (containing the sphecids and bees). The Vespoidea contains the ants, the scolioids, the tiphioids, the pompiloids, the vespoids and related groups. The big bombshell is the makeup of the Apoidea. Most New World bee workers will not accept a single bee family Apidae, but that is precisely what is presented in this book. They point out that Sphecidae may be paraphyletic with respect to Apidae and they may be right. I applaud the reduction in number of bee families, but bringing it down to one is perhaps a bit too far.

The authors are certainly inconsistent in their recognition of families in the Aculeata. Although they recognize only Apidae, they maintain the families Masaridae, Eumenidae and Vespidae while noting (p. 232) that Carpenter has united them under Vespidae in his cladistic analysis! They go on to remark that "whether this apparently logical step gains widespread acceptance awaits the test of time . . ." Well they didn't wait for time to pass, they simply rejected Carpenter's landmark study and maintained the three families. This is rather amazing in light of their declaration on p. 88 that "Where two classifications differ, and only one of them recognizes demonstrably holophyletic [monophyletic] groups, we have accepted the cladistic classification". Oh yeah? Then why Masaridae, Eumenidae and Vespidae? They point out that prior to the

introduction of the cladistic method by Hennig, that "acrimonious disagreements between experts were common." Well apparently cladistics hasn't changed anything! They sidestep the issue by declaring on page 232 that ". . . for the purposes of this book the eumenids are regarded as separate from the vespids at family-level". That smacks of sentimentalism for sure. Is this the way to advance the foreskin of science? Come on you guys, give us a break! By the way, in spite of the 1982 date on the journal, Carpenter's landmark paper on the Vespidae appeared in December, 1981 (that is when my copy of **Syst. Ent.** arrived in Washington).

I was amused to see that the authors of **The Hymenoptera** recognize 21 families in the Chalcidoidea, while admitting that the group is about the same size as the Ichneumonoidea in which they recognize only two families. Isn't it about time that chalcid workers break away from tradition and begin reducing the number of families? After all it is well recognized by chalcid workers, at least some of the younger ones, that chalcidoid families are almost impossible to define. The logic espoused by the authors of **The Hymenoptera** in defense of placing all bees in one family applies equally well to the Chalcidoidea where at best only a handful of families are defendable. Tradition dies hard.

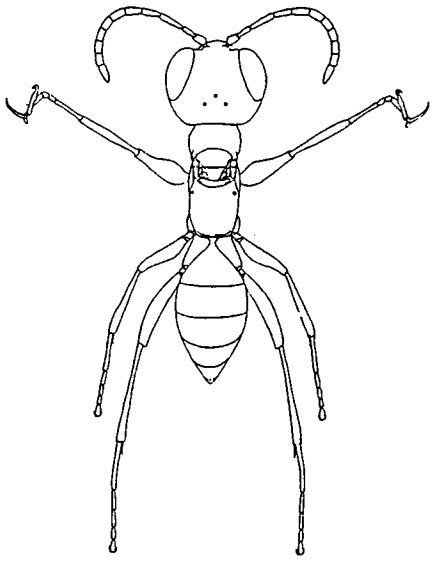
I haven't tried out the keys to superfamilies or families to see how they work, but they are based largely on the British fauna. I was intrigued by the wing fold characters used to separate Sphecidae and Apidae in the key to families (p. 221) and wonder if they will hold up on a world basis in all genera.

In passing through the familial treatments, I noted perpetuation in the Eucoilidae of the inept term "cup", coined by Lewis Weld, for the elevated, flat plate on the scutellum. "Cup" does not convey the appearance of this unique structure; scutellar plate is a far better descriptor. Again, tradition dies hard doesn't it! *Trybliographa* is misspelled on pages 142-143. The discussion under Chrysidoidea (page 223) does not include mention of Carpenter's 1986 cladistic analysis of the included families even though the paper is in the References section at the end of the volume and is listed after some of the family treatments. The use of the superfamily name Apoidea for Sphecidae and the bees may come as a shock to some, but Apoidea has priority over Sphecoidea. On page 248 the authors elaborate on their rationale for putting all bees in a single family Apidae, and it is a reasonable argument, but again their pragmatism is clouded by retaining Masaridae, Eumenidae and Vespidae. Their argument for using Apidae applies equally well for recognizing a single family Vespidae.

In summary **The Hymenoptera** is a valuable resource on the order and the book should be on the shelf of any hymen lover. The deficiencies noted are relatively minor and do not detract from its overall usefulness. In any multiauthor endeavour, inconsistencies are never entirely eliminated. I do feel, however, that the authors lost an opportunity to present a system of family recognition that comes closer to making them equivalent units (in their defense, I must add that a) modern analyses are needed in some superfamilies before realistic family limits can be achieved, and b) true equivalency of families probably will never be achieved since such concepts vary from one person to the next).

- Arnold Menke

[Earlier versions of this review appeared in **Ichnews** and **Chalcid Forum**. Also see review by Carpenter (1989) in Recent Literature.]



Mystrophorus formicaeformis Ruthe

A key to the world species of the Vespinae (Hymenoptera). - Michael E. Archer. 1989. (The following is a summary by the author.)

My key covers the 64 species that I have been able to distinguish. Three taxa normally considered subspecies have been raised to specific rank, viz.: *Vespa ducalis*, *Vespa soror* and *Vespa auraria*. Three new synonyms are introduced: *suprunenkoi* is considered a colour form of *Vespa binghami*, *walkeri* a colour form of *Vespa dybowskii* and *wilemani* a colour form of *Vespa vivax*.

I originally wrote the key for my own use but it was suggested I make it more widely available. This has given me the opportunity to try and master a desk top editor (Ventura) and a laser printer so that the contents and production are the results of my own efforts. I am certain my desk top editing could be improved.

The key is well illustrated with 72 figures which are made up of 198 drawings. These drawings are in a separate part to that of the text for ease of reference during use. In addition lots of blank space is available for notes and further drawings.

In the check list, besides the species listing, I have given details of a further 71 subspecies with references to the original descriptions of the species and subspecies. The current known geographical distribution of each species is also given. A brief introduction outlines the biological and taxonomic literature of the Vespinae.

I would very much like users of the key to let me know of any difficulties they experience so that I can make the relevant changes. Robin Edwards has already tried the keys and I have made many changes as a result of his experiences. I am in the process of writing a monograph on the Vespinae and I will be able to include changes to the key in this monograph. As my key goes to press Chris Starr has sent me two papers by Prof. Lee Tiesheng describing nine new species of Vespinae from China so that like all keys mine becomes immediately out-of-date. Previous experience of Chinese work suggests their new species could be previously described taxa so the types will need examining before their validity can be accepted. When I am able to do this I will keep readers of **Sphecos** up-to-date.

The key can be obtained from myself at: The College of Ripon & York St. John, YORK Y03 7EX, England, U.K. To cover package and postage a charge of £3 sterling for surface mail and £6 sterling air mail has to be made, unfortunately. Please make payment available to me, Dr. N.E. Archer. If you have difficulty in obtaining £ sterling please let me know and I will make other arrangements for you to receive a copy.

Additional comments
by
the **Mud D'aub**

Archer's key is spiral bound which I discovered makes the publication easier to use. At first I questioned the placement of the figures in a separate binding, but it actually makes it easier on the user because illustrations referred to in the key can be kept close at hand. Some figures are simple line drawings that often are rather crudely rendered, but Archer apparently regards this as basically a "working" document.

In using the key to genera I discovered that the user should have been informed that the tergal character (fig. 7) used in couplet 4 on page 4 is usually not visible without dissection. Also the description of this character in the key is different from that used in the figure explanation ("posterio-lateral" vs. "dorsal"). In my experience, the ventral side of the male genitalia offers more characters than the dorsal side. The latter, however, is used exclusively by Archer in the illustrations. It would have been helpful to have the names of the taxa under each figure.

The introduction is largely a synopsis of the essential taxonomic works published up to the present time. In spite of Carpenter's cladistic analyses of the genera of the Vespinae, Archer has deemed *Paravespula* worthy of generic rank. But the characters used in his key to genera are trivial when it comes to separating it from *Vespula*. The genera traditionally recognized by most modern workers, *Vespa*, *Provespa*, *Dolichovespa* and *Vespula*, key out on the basis of a few non-variable characters. But in keying *Paravespula* Archer had to resort to a lengthy couplet that includes some unreliable characters (i.e., variable). In my opinion the length of this couplet belies the validity of recognizing *Paravespula* as a genus, or to put it another way, **Menke's Dictum*** applies here. The same reasoning applies in the recognition of the two subgenera of *Paravespula*: *Rugovespula* and *Paravespula*. One has to read a book to determine the subgenus to which a species belongs! Come on Michael, these are just species groups.

Archer says in the introduction that the "justification for [recognition of *Paravespula* as a genus] will be given in a future paper" (a similar statement is made for his new synonomy and new status). I suppose that since he regards the present work as provisional, a working copy if you will, that a formal explanation of his rationale for the recognition of genera and subgenera is unnecessary. But some sort of discussion should have been included. Since the paper contains new synonymy and new status for a few taxa these should have been indicated in an abstract or summary at the beginning of the paper so that **Zoological Record** can easily record these.

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*__Menke's Dictum__ states: The validity of a genus is inversely proportional to the length and complexity of its identification key couplet. (Hey, if we can have **Day's Organ** - see p. 16 - why not **Menke's Dictum**?)

Schauff's Corollary: The validity of a genus is inversely proportional to the number of times it appears in an identification key.

A key to the world species of the Vespinae (Hymenoptera). - M.E. Archer. 1989. Research Monograph of the College of Ripon & York St. John, No. 2. ISBN #0-9511738-3-9.

With this work, Archer has provided keys to the species of Vespinae he recognizes. A very brief summary of recent literature, incomplete checklist and an abbreviated list of references accompany the key. Several changes in status of specific taxa are made, but justification is deferred to a later paper, a questionable practice. Aside from the figures, the desktop production is adequate (and should allow for easy revision), and the separate volume for figures is a good innovation.

The work suffers from three major deficiencies. First, *Paravespula* is recognized as a genus, and two subgenera are recognized within this. In Carpenter (1987, **Syst. Ent.**) I synonymized these taxa with *Vespula* on the grounds that although natural they were based on a few minor characters, hence their formal recognition contributed little to the process of efficient diagnosis in classification. These taxa are merely another manifestation of the invidious generic fragmentation in Vespidae initiated by Blüthgen, which has led to the present state of chaos in the taxonomy of the group. My papers on higher classification in Vespidae have begun to rectify this situation, but Archer does not say why he rejects this advance. He lacks experience in vespid taxonomy aside from vespines, so perhaps this is an example Menke would characterize as failing to see the forest for the trees. Archer also described one of the synonyms in question (*Rugovespula*, actually a Yarrow collection name), so sentiment may play a role. All that is stated here is that a justification "will be given in a future paper". It is therefore amusing that Archer's keys actually provide support for the less split classification. *Vespa*, *Provespa*, *Dolichovespula* and *Vespula s.l.* key out readily in a half-page of text, with straightforward, obvious characters. By contrast, the separation of *Rugovespula* and *Paravespula* from *Vespula* requires a page and a half of text, with the characters either subject to exception or not obvious. This impinges crucially on the functionality of the keys, since these "genera" must be keyed out before the species can be. I hope this irony is not lost on users of the key, who should not follow Archer's classi- fication.

The second primary deficiency is the figures. They are quite crude, and although they will suffice for simple features, they are simply inadequate for structures such as the male genitalia. The genitalia figures render the volsella so poorly they will in fact prove misleading. These figures were drawn in dorsal view, but should have been done in ventral view, which allows more detail to be shown. The volsella, which is an important source of characters in this group, should probably also be drawn separately in lateral view. Other figures exhibit problems as

well. The lateral views of the pronotum are drawn with the anterior to the right, whereas the convention is that the anterior be to the left. Ventral views of the terminal sterna similarly are drawn with the anterior toward the bottom when it should have been the top in Figs. 33 and 43 (yet the correct orientation is employed in Fig. 9 and the figures of the terga). Views of the wing are also inconsistent, and Fig. 71 shows different sides of the paramere for the two species being compared in the same figure (Fig. 39 does as well, deliberately). Outlines of the apical margin of the clypeus showing a morphocline in shape of the emargination lack sufficient detail to convey the real differences, and lateral views of the clypeus and Figs. 48 and 52 lack enough detail to convey much of anything. These and other figures appear to be no more than preliminary sketches, which should not have been published.

The check list is the third salient flaw. It is more like an outline than a checklist. The species Archer recognizes are listed, the descriptions are cited (although the original combinations are not), and distributions are summarized. Subspecies are also listed, although Archer states his hope that the use of this category "will be suspended". Incredibly, however, no synonyms are given! Further, although Archer in his announcement notes nine recently described species by Lee, there is no mention of them in the checklist at all - evidently because "the types will need examining before the validity of the new species can be accepted"! I am amazed that such an incomplete effort was ever published; it would not have passed adequate peer review.

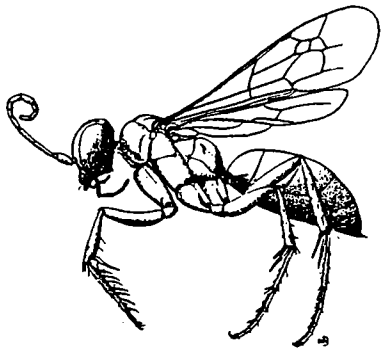
As to the keys themselves, the *Provespa* key is the easiest to use and it and the *Vespa* key are the best. The *Vespa* key is probably the most valuable addition to the literature, since it meets the greatest need. The *Dolichovespula* key is the most difficult, relying far too extensively on metasomal color patterns, which show more variation than allowed for here. Problem couplets include: couplet #4 for the *Vespula rufa* group (although the note accompanying the couplet allows for easy separation of *intermedia* from the others), separation of *vidua* in couplet #8 of the same key, separation of *Vespula atropilosa* and *acadica* females, couplets #5 and 8 in the *Vespa* key females), couplets #7 and 26 in the *Dolichovespula* key, separation of *Dolichovespula saxonica*, separation of *Vespula maculifrons* and *flavopilosa* (queens and workers), and couplet #3 in the males of the *Vespula vulgaris* group. Most of the problems arise from use of traits subject to exception; a few from vague wording. *Vespula pensylvanica* has a (minor) error in the queen couplet, *Dolichovespula arenaria* is keyed out twice in the female key and *Vespula atropilosa* is keyed out twice in the worker key.

It is unfortunate that these flaws detract needlessly from the quality of the keys. However, revision will be forthcoming in later work. The modest cost should encourage anyone with an interest in these wasps to purchase the present key, and *caveat emptor* the user will find it a helpful supplement to the scattered literature previously necessary to identify Vespinae.

- **James M. Carpenter,** Museum of Comparative Zoology, Harvard University, Cambridge, 02138, U.S.A.

BM(NH) - Disturbing News

Aculeate research at the BM may be a thing of the past if reports emanating from England are true. We hope to be able to present an accurate report on the situation in **Sphecos** 20 - stay tuned.



Pompilus cinereus (F.)

SCIENTIFIC NOTES

Further Records of the Utilization by Aculeates of Old Paper Wasp Nests

by
Fred W.Gess
(Albany Museum, Grahamstown
South Africa 6140)

Recently Gregg Henderson (**Sphecos** 18:10) drew attention to the incidental utilization of old *Polistes* nests by *Megachile centuncularis* (L.) in Wisconsin and commented that such utilization had to his knowledge not been reported before. It may therefore be of interest to place on record a very similar utilization of such nests by a megachilid bee and also by a sphecid wasp in South Africa.

Several old *Polistes* nests, knocked down during the cleaning of the museum facade on 24 January 1973, were found by myself to have had a few of their cells capped, in some instances with small circular discs cut from leaves and in other instances with mud. Five bees, all male *Megachile (Eutricharaea) gratiosa* Gerstaecker, emerged from the leaf-capped cells during the period 6-12 March 1973. One wasp, a female *Pison transvaalense* Cameron, emerged from a mud-topped cell on 25 January 1973. A dead female and four dead males of the same species were extracted at a later date from cocoons within mudtopped cells.

I have otherwise found *M. gratiosa* nesting in trapnests positioned on a vertical shale bank and in small trees and also in the old resin and pebble cells of *Hoplitis jansei* (Brauns) built on the surface of stones. I have not, however, found other nesting sites of *P. transvaalense.*

On account of the relatively small size of the individual cells in the old *Polistes* nests their use as pre-existing nesting cavities by the two species limits them to the construction of unicellular nests and the bee apparently to the rearing of male offspring only. The same applies to the bee using *Hoplitis* cells.

How do the two species, and in particular the wasp, prevent the provision from falling out of a vertical or near-vertical down wardly opening cell !?

Further Remarks on Rent-Nesting in Old *Polistes* Nests

by
Christopher K. Starr
(Dept. of Horticulture, University of Georgia, Athens, GA 30601)

Like Gregg Henderson (**Sphecos** 18:10), I have often noticed megachilids reutilizing the cells of old *Polistes* nests. In Georgia such old nests often contain mud cells which I assume are built by *Trypoxylon* (*Trypargilum*), and I have occasionally found other solitary aculeates nesting in them. There is an obvious adaptive advantage in such renting, as *Polistes* nests in protected situations can persist for years, and they proffer an abundant supply of ready-made standardized nesting cavities.

If old paper nests are such a boon to the hard-working megachilids and sphecids of North America, why do these not always rent when nests are available? Gregg suggests an answer in finding very low (6%) brood-rearing success in a sample of 521 rented cells. Several of us have suggested that residual parasites account for the virtual absence of *Polistes* taking over abandoned nests, and this may also be the chief disadvantage when other species utilize these nests. However, renting is quite common among solitary aculeates, and I suspect that flexible nesting habits are much more widespread than is now recognized. My experience with *Pison argentatum* and some other mud-nesting wasps in Southeast Asia suggests that the builder/renter dichotomy does not apply to many species. In that case, when *Megachile centuncularis* and some others rent in *Polistes* nests it may not represent the insignificant blunder which we assume it does when *Polistes* reutilizes.

I would very much like to this question pursued. There has been little quantitative study of brood-rearing success (i.e. the probability that a provisioned, closed cell will produce a viable adult) in solitary aculeates, and as far as I know no one has measured the adaptive factors in building vs. renting. This seems to me quite a tractable and interesting problem.

Early Males in *Polistes major*?

by
Christopher K. Starr

On a visit to Florida in June 1989, I found *Polistes major* to be the most abundant member of its genus in the Miami area. What I found surprising in my brief observations was that several apparently quite healthy colonies were already producing males at that time. Specifically, I noted males on the four largest nests and on no others.

The three colonies which I collected (during the middle part of the day, so that some females were undoubtedly absent) were of the following sizes:

1. 58 females, 18 males, 670 nest cells.
2. 20 females, 5 males, 350 nest cells.
3. 15 females, 4 males, nest (not collected) estimated at 200-300 cells.

I made no attempt to collect the fourth colony, which had roughly 20-30 females, a few males, and 300-400 nest cells.

If the trend suggested by these very sketchy data is real, then *P. major*'s colony-cycle in this seasonal subtropical habitat merits closer attention. In particular, if the more successful colonies produce males early in the season, then the species may be facultatively bivoltine in south Florida.

Social vespids massing in Tuxtla

by
Frank Parker
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While at Tuxtla in Mexico early this year (1989) I noticed a huge population of *Polybia* at the USDA screw worm distribution center. There they package up to 500 million flies per week, so lots of weak and dead ones are about. Anyway, the *Polybia* are cleaning up on the flies and associated food which makes for a very large artificial population. Some vespid nut should spend some time there. At the rearing facility is an unusually large population of *Polistes*. These facilities are scheduled for relocation in a couple of years and it would be a good opportunity for someone to explore population dynamics now and later when food supply is limited. When the new plant is constructed, you could begin another study because the new place will be a permanent location either in Panama or Costa Rica. One doesn't encounter such large populations normally and this would provide a good "laboratory" for studies.

The Mechanics of Mating in *Polistes fuscatus*

by
Gregg Henderson
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Have you ever watched paper wasps attempting to mate? I have, lots of times. Whenever starting a research project on a new animal I make it a point to collect some so that I can watch them all-year-round. It's a good way to get to know your animal, and more importantly, know what questions you will be able to address given their behavioral tendencies. I tended to take lots of notes on mating behavior. One aspect of the behavior I took particular interest in was the apparent mechanical nature of the event. Not that the process went smoothly - far from it. Though mating attempts were frequent, on only two occasions did actual coupling take place. As the male climbs on top of the female he wraps his legs around various parts of her body and his long, hooked flagella stroke the antennae of the female. Never once did I observe the female to appear accepting of this behavior but instead made attempts to separate herself from the male. However, I noticed that when the male pulls the female's antennae back against her body she arches back in a very characteristic way. When arched back like this, the female's distal tergum and sternum separate enough for the male to make a successful coupling. This suggests to me that the mechanics of a male bringing the female's antennae back against the body functions to position the female's mating apparatus into a position inducive for a successful mating. Such a mating strategy may also indicate the selective advantage of apparent conflict in mating. A male that is not strong enough, or is for example, lacking an antenna, will not mate. [Boy, is this scientific pornography or what??!! I got so excited

when she arched her back in response to his antennae! **Sphecos** is always breaking new ground - remember you read it here first! - edit.]

Male Wasps Sting Too
by
Gregg Henderson

Even the trained researcher tends to let go of a male wasp held between the fingers when it brings its gaster down into a stinging position. Much has been written about the evolution of "mock-stinging" behavior. However, handle enough male *Polistes fuscatus* and you will get "stung". The sting doesn't hurt as much the female's sting, but you get the definite sensation that you were just stung. Closer examination of the pained area reveals a small red dot. The dot never swells but will remain visible for several hours. The reality of such an event is that I've been apparently inseminated via the heavily sclerotized aedeagus. Thus, male stinging behavior may not be a complete facade and we cannot dismiss the possibility that the intention of the behavior is to "sting".

Pepsis novitia Banks in Texas
by
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Pepsis novitia Banks 1921 (Pompilidae) from Fedor, Lee County, Texas, was regarded by Hurd (1952) as a hybrid of *P. cerberus* Lucas 1895 X *P. elegans* Lepeletier 1845. In my first spring at Kingsville, Texas (1967) *novitias* were topping the hedge in front of my house in considerable numbers. I wrote to Paul Hurd, and he encouraged me to learn what I could of the biology and color forms. I observed the species over my twenty years at Kingsville, particularly females searching actively over well-watered lawns, to which they seemed particularly attracted. Their numbers declined over the years as, I hypothesize, their wide-ranging activities took them to lawns increasingly treated with fertilizer-insecticide combinations. Their host appeared to be a trapdoor spider, a species commonly appearing in residential areas after rains. Many were brought to my laboratory, and Dr. W.J. Gertsch in a 1986 letter to me expressed conviction the species was *Eucteniza rex* (Chamberlin), which would be expected to burrow in lawns. He said Chamberlin placed these spiders in a special genus, *Astrosoga*. Despite the many female wasps I saw and sometimes followed, none were with prey, which I assume are stung and left entombed in their own burrow. *Cerberus* at Kingsville is common but seems to be a "country" wasp, and I don't recall ever seeing any around the lawns in town. Once, though, they were abundant over a dry lawn at Alice, Jim Wells County, Texas, about 30 miles northwest of Kingsville. At hand are 77 specimens of *novitia* (55 male, 22 female) from Kingsville, Kleberg County, Texas, just a few of the many seen, and also specimens from Bee, Hidalgo, Nueces, and San Patricio Counties. In Mexico I collected one specimen 9 miles east of Ocampo, Tamaulipas and three females and a male in moist woods 3 miles south of Tamiahua, Vera Cruz.

Lucas (1895, **Berlin. Ent. Zeitsch.** 39: 814) inludes transcripts of original descriptions of *P. elegans* and the later synonymized *P. duplicata* Cresson 1867. In both cases antennae are noted as yellowish except for the basal two segments, and the same is true of the male and female *elegans* I have examined, as well as those studied by Salman (1929, **Trans. Amer. Ent. Soc.** 55:120). The antennae are also this way in the original description of *auranticornis* Lucas (1895: 605) with which Lucas indicated possible synonymy of *elegans*. There are thus three species, *cerberus* with black antennae, *novitia* with the apical 5-8 segments yellowish in both sexes, and *elegans* with the flagellum entirely yellowish. *P. elegans* has the wings black in both sexes, *cerberus* yellowish except the marginal and basal areas are black in both sexes, and *novitia* females similar except the yellowish (orange) areas usually appear as a richer reddish color. *P. novitia* males are black-winged in 39 specimens from Kingsville and partly yellowish in 16, although never as broadly so as in the females. None of my *cerberus* males have entirely black wings, but they have more black than their females.

Mutillidae of Trinidad
by
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Seven subfamilies are currently recognized in the Mutillidae (Brothers, 1975), two of which - the Sphaeropthalminae and Mutillinae - occur in Trinidad, West Indies. During my residence there from 1937 to 1951, I sent numerous mutillids to the late Clarence Mickel for identification, and specimens are in the collection of the University of Minnesota. Additional material was given subsequently to my friend Denis Brothers. Mickel, who died in 1982, planned to write an account of the Trinidad mutillids, similar to his review (Mickel, 1952) of the Mutillidae of Guyana (formerly British Guiana), and I present these records in tribute to him. Species of the genera *Hoplomutilla*, *Timulla* and *Traumatomutilla* were reared from known-hosts.

SPHAEROPTHALMINAE

Hoplocrates pompalis Mickel

Hoplomutilla opima Mickel
A female reared from a cell of *Centris rufosuffusa* Cockerell (Callan, 1977).

Pertyella decora Mickel

Pseudomethoca plagiata (Gerstaecker)

Pseudomethoca spp.

Lophomutilla triguttata Mickel

Traumatomutilla indica (Linnaeus)

Traumatomutilla latona Mickel

Traumatomutilla sphegea (Fabricius)
A male (det. D.J. Brothers) reared from a cocoon of *Stictia signata* (Linnaeus) at Talparo. Mickel (1952) stated that *sphegea* may be the male of *indica*.

Traumatomutilla spp.

MUTILLINAE

Timulla bitaeniata (Spinola)
A male and female taken in copula showed that *byblis* Mickel is the male of *bitaeniata* (Mickel, 1952).

Timulla eriphyla Mickel
Three females reared from cocoons of *Tachysphex inconspicuus* Kirby (as *blatticidus* Williams)(Callan, 1942).

Timulla mediata (Fabricius)

Timulla mediata pexa Mickel

Timulla nisa Mickel

Timulla rectangula (Spinola)

Timulla rufogastra (Lepeletier)

Ephuta emarginata Mickel

Ephuta trinidadensis (Ashmead)
See Krombein (1949).
Ephuta spp.

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Callan, E. McC. 1942. A note on *Timulla (Timulla) eriphyla* Mickel (Hym., Mutillidae), a parasite of *Tachysphex blatticidus* F.X. Williams (Hym., Larridae), from Trinidad, B.W.I. Proc. R. ent. Soc. London (A) 17:18.

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Mickel, C.E. 1952. The Mutillidae (wasps) of British Guiana. Zoologica 37:105-150.

Sphecidae of New Caledonia
by
E. McC. Callan

New Caledonia in the south-west Pacific Ocean is a mountainous continental island with some of the characteristics of an oceanic island and has long been isolated from any continental land mass. Sphecidae are represented by relatively few species in the four subfamilies Ampulicinae, Sphecinae, Larrinae and Crabroninae. Their relationships lie with Australia, but many species are endemic. Williams (1945) discussed 12 species in his excellent account of the aculeate wasps, but was doubtful about the identity of *Pison rufipes* Shuckard. His specimens are in the Bishop Museum, Honolulu, Hawaii with additional unstudied material. I now report 17 species and update the names applied to them. The record of *Pison argentatum* Shuckard is based on a determination in 1978 by W.J. Pulawski. New Caledonia was joined to or at least near Australia after the separation of New Zealand, and, although endemism is marked, it is not as great as that in New Zealand. It is significant that 16 species of sphecid wasps are known from New Zealand (Callan, 1979), but not a single species is common to both New Zealand and New Caledonia.

AMPULICINAE
Ampulex compressa (Fabricius), 1781

SPHECINAE
Sceliphron caementarium (Drury), 1773
Sceliphron fuscum Klug, 1801
Sceliphron laetum (F.Smith), 1856
Sphex fumipennis antennatus (F.Smith), 1856

LARRINAE
Liris clypeatus (F.Smith), 1873
Liris festinans (F.Smith), 1859
Liris transversus Cheesman, 1955
Nitela austrocaledonica Williams, 1945
Pison argentatum Shuckard, 1838
Pison ignavum Turner, 1908
Pison novocaledonicum Krombein, 1949
Pison rufipes Shuckard, 1838
Pison strictifrons Vachal, 1907
Pison susanae Cheesman, 1955
Tachysphex fanuiensis fanuiensis Cheesman, 1928

CRABRONINAE
Williamsita novocaledonica (Williams), 1945

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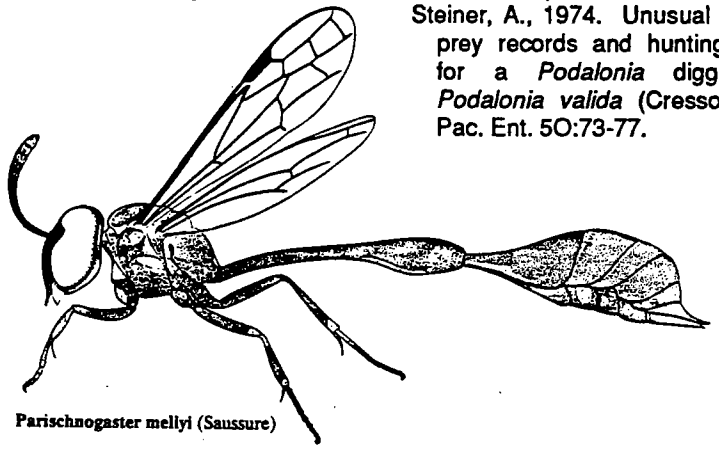
[Note by Menke: The pemphredonine genus *Arpactophilus* occurs in New Caledonia (Menke, 1989) and the larrine species *Sericophorus rhinocerus* was just described by Pulawski (1989). See Recent Literature.]



Parischnogaster mellyi (Saussure)

Prey record for *Podalonia valida* (Cresson) (Sphecidae)
by
Arnold & Kurt Menke

After completing the Sierra hike described elsewhere in this issue, we returned to Albuquerque, New Mexico where Kurt lives. The two of us decided to go fossil hunting for a couple of days near the ghost town of Lake Valley in Sierra County (18 miles south of Hillsboro). While wandering through the ruins of this old silver mining town, we came upon a large *Podalonia* walking along with a spiny arctiid caterpillar. Arnold caught the wasp and Kurt retrieved the caterpillar. Examination of the wasp showed that it was the western species *valida*. The caterpillar was identified by Douglas Ferguson as belonging in the *Grammia nevadensis* complex. This record reinforces the fact that *valida* prefers spiny (*Grammia* sp., *Apantesis* sp.) or hairy (*Estigmene* sp.) arctiid caterpillars unlike most other members of the genus (see Steiner, 1974; Menke, 1985; Evans, 1987).

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Reporte de *Podium fulvipes* Cresson (Hymenoptera: Sphecidae) predando sobre Gryllidae (Orthoptera)

by
Julio Antonio Genaro
y Coralia S. Sanchez A.
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Es bien conocida la tendencia de los esfécidos a restringir la predación a miembros específicos de artrópodos para la alimentación de la progenie. Existen varios estudios sobre la conducta de nidificación del género *Podium*, los cuales citan como presas a especies de cucarachas (Dictyoptera: Blattaria)(Bohart y Menke, 1976: **Sphecid wasps of the world**, 695 p.). Sanchez y Genaro, en prensa (Inquilinos de *Sceliphron assimile* (Dahlbom), con especial referencia a *Podium fulvipes* Cresson (Hymenoptera: Sphecidae), Poeyana), reportan la utilización de cucarachas pertenecientes a las familias Blattidae, Plectopteridae y Blaberidae para el aprovisionamiento de los nidos.

En la colección entomológia del Instituto de Ecología y Sistemática, ACC, está depositada una hembra de *fulvipes* con su presa, colectada por L. F. de Armas y M. G. Casanova, en San Antonio de los Baños, La Habana, en diciembre de 1984. La presa, una hembra inmadura de la especie *Orocharis gryllodes* (Pallas) (Orthoptera: Gryllidae) se encuentra en el mismo alfiler, debajo de la avispa. L. F. de Armas (com. pers.) colectó a ambos insectos mientras el esfécido transportaba la presa en vuelo (como es usual en el género). Este constituye el primer reporte que conocemos de *Podium* predando sobre grillos.

Podium fulvipes habita en zonas boscosas y nidifica en cavidades pre-existentes. Lo hemos observado caminando rapidamente entre las hojas y tallos de arbustos, buscando a sus presas, manteniendose gran cantidad de tiempo en esta actividad. Esta conducta de caza posibilita una mayor probabilidad de encuentro con este tipo de presa. Es importante tener en cuenta que la presa reportada pertence a la subfamilia Eneopterinae, constituída por los "grillos arbóreos", que pueden encontrarse bajo la corfteza de los árboles o entre el follaje, donde realizan el subnicho estructural, semejante al de algunas cucarachas utilizadas por *P. fulvipes* (obs. pers.). Quedaría por determinar si este constituye un hecho aislado o es una adaptación al hábitat, producto de la escasez de presas.

Preliminary observations of sphecids of the Reserva la Macarena, Meta, Colombia

by
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La Reserva La Macarena (veáse mapa) por su extensión (originalmente 1 300 000 ha ocupa un lugar de importancia entre las reservas del país; su posición geográfica muestra una clara influencia de la fauna y flora de la regió andina (al occidente), amazónica (al sur) y de sabandas (al oriente); el corredor del río El Duda, entre la Sierra y la cordillera oriental forma un pasaje húmidoentre las sabanas de los llanos orientales y las selvas amázonicas, pudiendo constituir un refugio en el pleistoceno. En la Reserva La Macarena, por otra parte, se encuentran formaciones rocosas muy antiguas y heretogéneas (escudo guyanés) lo cual la ha caracterizado como "primitiva" (Gonzales et al, 1988). Dentro de la reserva se encuentran paisajes muy diferentes, como bosque primario (hacio el suroccidente), bosque secundario, bosque de galería, sabanas, rastrojos, cultivos y "islas de bosque" en medio de las sabanas. La presencia de colonos ha modificado notablemente el paisaje en un 50% de la reserva (Amat & Vargas, 1988) lo cual agrega un factor de inestabilidad en el paisaje. Los factores anteriores han impulsado recientemente trabajos sobre su flora y fauna tendientes a evaluar la riqueza y diversidad biótica de la reserva y la influencia humana sobre ésta.

Fernández, Cubillos, Bonilla y Schneider (1989) llevan a cabo estudios sobre la distribución y ecología de los himenópteros aculeqados de la Reserva desde 1984, especialmente en abeujoas y hormigas. Ultimamente se ha incrementado el material de Sphecidae y avispas inferiores (Chrysidoidea, Scolioidea, Pompiloidea), que permite aquí presentar una lista preliminar de los sphecidos hasta el momento identificados con algunas breves notas.

Después del siguiente listado se agregan aquellos paisajes en los cuales se colectaron los ejemplares: BP = Bosque Primario; BS = Bosque Secundario; BG = Bosque de Gale - ría (asociado a caños y ríos); S = Sabanas; C = Cultivos de Colonos; R = Rastrojos, claros, playas de ríos. El listado sigue el arreglo de Bohart y Menke (1976).

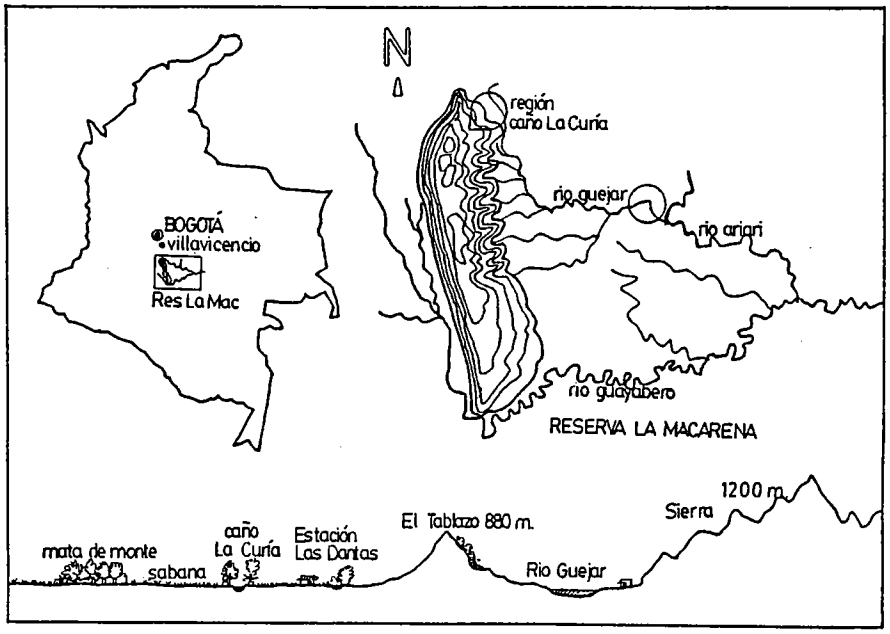
SPHECIDAE

SPHECINAE

Sceliphrini

Chlorion mirandum (Kohl) BS, R

Sceliphron fistularium (Dahlbom) BG



Sphecini
Sphex caliginosus Erichson S
Sphex opacus Dahlbom S
Prionyx fervens (Linnaeus)
Ammophilini
Eremnophila opulenta (Guérin-Méneville) BS
Eremnophila sp. BP
Ammophila sp. BS

PEMPHREDONINAE
Pemphredonini
Microstigmus comes Krombein BS

LARRINAE
Larrini
Larra sp.
Tachysphex sp.
Trypoxylini
Trypoxylon sp. 1 BG
Trypoxylon sp. 2 BG

NYSSONINAE
Bembecini
Bicyrtes discisa (Taschenberg) BG
Rubrica denticornis (Handlirsch) BG
Stictia punctata (Fabricius) BG
Stictia signata (Linnaeus) BG
Microbembex ciliata (Fabricius) BS,C
Editha magnifica (Perty) S

PHILANTHINAE
Philantini
Trachypus sp. BG

Permanece aún un material (especialmente en Bembecini) sin identificar perteneciente a BP, BS, BG, R, C.

En general los sphecidos parecen preferir las zonas abiertas y claras, entre bosque secundario y sabanas. En verano los ríos descienden en su nivel y las arenosas playas son activamente disputadas y utilizadas por sphecidos y antofóridos. Algunas avispas (como *Sceliphron*) utilizan construcciones humanas para la construcción de sus nidos. Entre las presas favoritas por algunos sphecidos observamos arañas (Araneae), cucarachas (Blattodea) y homópteros (Membracidae). Algunos sphecidos forrajean activamente en las plantas con flores do las sabanas (Labiatae) en búsqueda de néctar. *Microstigmus comes* se observó nidificando en una Melastomataceae (Cubillos & Martinez, 1989), especie que en Costa Rica nidifica en una palma (Matthews, 1968). *Editha magnifica* se conocía al sur de la amazonía (Fritz, comunicación por escrito) registrándose recientemente para Venezuela (Menke, 1984); este registro para Colombia es interesante. Esta especie se encontró en el noroccidente de la reserva, en sabana cercana a el caño La Curía, a 580 m. de altura.

Es muy posible que el material que aún no se ha indetificado (y mucho por colectar!) arroje resultados tan interesantes como el de *E. magnifica* o como se ha observado en algunas abejas y hormigas (Fernández et al, 1989). Los endemismos observados, junto a distribuciones inusuales podrían ser consecuencia de la posición geográfica de la reserva, su rica diversidad de paisajes y ambientes, la presencia desestabilizante de los colonos y posiblemente el papel de refugio de valle del río Duda y piedmente llanero del occidente de la reserva.

La presencia del colono y la actual política estatal de manejo de la reserva deben ser del interés de la comunidad científica internacional, pues la diversidad y requeza bióticas de La Macarena no es asunto nacional sino patrimonio internacional.

Agradecimientos

Muchas gracias a los doctores Abraham Willink y Manfredo Fritz por su amable colaboración en la identificación de ejemplares, y al Dr. A.S. Menke por su oportuno y generoso apoyo bibliográfico.

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How to Bug a Bug

by

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In 1978 two of us (JS and JWS) began a long-term study of the population biology and behavior of the beewolf *Philanthus sanbornii* Cresson (Sphecidae; Philanthinae) at a site about 30 miles northwest of Boston, Massachusetts. A few brief research notes concerning the study have appeared in previous issues of **Sphecos**, and we will soon submit a manuscript to **Evolutionary Ecology** analyzing more than 3 prey items, representing more than 100 species, taken by the population in 1978-83. (Howard Evans and Kevin O'Neill review the state of philanthology in their 1988 book, **The Natural History and Behavior of North American Beewolves**.) Here we describe the Philanthophone, an eavesdropping device we used to pick up some real dirt about what goes on in private, behind closed nest entrances.

Philanthus females spend a great deal of time in their burrows, but there is no way to observe directly what they are doing while inside. Simon Thomas and Veenendaal (1978) persuaded females of *P. triangulum* to nest in a glass-sandwich apparatus. These authors obtained extremely valuable observations of prey manipulation, egg-laying, and other related behaviors. However, a problem with this approach is that the observed be- haviors are likely to differ in some respects (e.g.

timing and duration) from those that occur in natural nests.

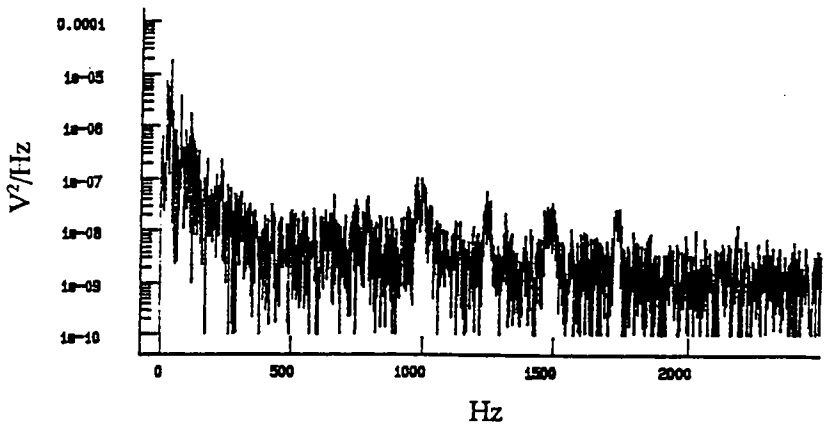
We noticed that when a *P. sanbornii* female is working on her tumulus pile, moving recently-excavated sand away from the nest entrance, she frequently pauses for a fraction of a second and emits a loud buzz which appears to be caused by a momentary activation of the flight muscles, with the wings remaining folded over the abdomen. This buzz can easily be heard from a distance of one or two meters; we assume that its purpose is to shake dust (highly abrasive?) out of intersegmental membranes, and possibly to clear the spiracles a well. Might this behavior also occur inside the nest, during bouts of excavation? If so, would the sound be transmitted through the ground with sufficient intensity to be picked up by a geophone buried nearby? (Sounds made deep within the burrow system are unlikely to carry all the way to the nest entrance, through the air, owing to the rough texture of the burrow's walls, its many twists and turns, and the soft internal closures created as the wasp pushes newly excavated sand behind her.) Would the act of excavation itself be audible? A female's working of the undisturbed soil with forelegs and mandibles might be expected to create a relatively intense acoustical signal, because the coupling of wasp to substrate would in this case be direct.

The answers to all these questions turn out to be yes. Our first crude Philanthophone was assembled in 1984 entirely from parts we had at hand. First we wrapped a small crystal lapel microphone in a Baggie® (Mobil Chemical Corporation), and buried it as near as seemed safe to where we guessed a female would be working (i.e. about 40cm from her nest entrance, at a depth of about 25cm). Then we connected the microphone leads to the input of a battery powered electric-guitar preamp (Barkus-Berry 1330) and sent its output to the line input of a portable tape recorder. After plugging a pair of headphones into the appropriate output jack of the tape recorder, we turned all the controls to full volume and found ourselves transported (through a hissing rain of transistor noise) to a rich new world of underground sounds. Unfortunately, the dominant features of this world were (1) traffic on the nearby highway and (2) small plants flapping in the breeze. But to our delight we soon also heard what we had hoped for, and much more.

The flight-muscle buzzes can indeed be heard (see figure), and they occur frequently when the wasp is working underground. Digging makes its own distinct signature that vaguely suggests a person eating celery. Under ideal conditions, a female can be heard simply moving through her burrow. But the strangest sounds occur during the interval between prey trips. We had often wondered why *P. sanbornii* females spend 5 to 15 minutes inside the burrow after returning wth a captured bee or wasp, when 30 seconds or so would be plenty of time to deposit the prey. We soon discovered that a lengthy ritual takes place, which we interpret as the prey being dragged back and forth through a pile of loose sand (or buried in it? - see Simon Thomas and Veenendaal); the loudest sounds produced in this context are repetitive, highly stereotyped sequences that suggest a person smoothing a piece of wood with sandpaper.

We were unable to make much sense of this behavior until we remembered that Kurczewski and Miller (1983) had pointed out that *P. sanbornii* females apparently remove pollen from the female bees they capture as prey; bees are often seen going into the nest heavily loaded, but neither K&M nor we have ever seen more than traces of pollen on bees in completed cells; and when excavating a nest, one occasionally finds pollen in regions of loose sand near the main burrow. If these sand traps are indeed the sites of a post-capture cleaning ritual, then what is the main purpose of the ritual? Is it to remove pollen (which could promote the growth of fungi), or to remove the eggs and first-instar larvae of parasitic flies (which eat the prey before the wasp larva is able to do so)? We wish we knew.

Every part of the original Philanthophone has subsequently been improved, or at least changed. A microphone in a Baggie is clearly not an ideal geophone, even though it works surprisingly well in practice. Most real geophones are designed to detect very low frequencies (e.g. dynamite blasts used in oil exploration), but we have had good luck with the two models we have tried (GeoSpace GS-100 and GS-20DH). Something with peak sensitivity in the 2000 Hz range would be best, but we have not yet found (or learned how to make) such a device. We did build a multichannel amplifier, based on inexpensive preamp and power-amp chips obtained from Radio Shack (circuit diagrams sent on request), and this has allowed us to make stereo recordings that give some feeling for the movement of the wasp in her



Power spectrum of a typical "flight-muscle buzz" made by a *Philanthus sanbornii* female working in her burrow, recorded from a geophone buried nearby. The buzz lasts only a few hundred milliseconds, but we digitized about 800msec of the recording in which it is embedded (4 points at 5kHz); the signal-to-noise ratio is therefore worse than it would have been with a narrower temporal window placed precisely over the buzz. Note that power (v^2/Hz) is displayed on a logarithmic scale. The fundamental frequency of the buzz is slightly below 250Hz, buried in the low-frequency noise (but obvious to the human ear). Harmonics at around 1000, 1250, 1500, and 1750Hz can easily be seen against the much lower levels of noise at those higher frequencies. Harmonics at 500 and 750 Hz ought to be visible as well, but are not. Their absence (or near absence) is very interesting; it seems to imply that these frequencies correspond to modes of vibration that are somehow suppressed in the wasp.

burrow. More powerful amplifiers based on discrete low-noise transistors would undoubtedly be better, but again, there is no real need for such sophistication. The main requirements seem to be two stages of amplification, a quiet environment, and patience.

Anyone interested in the activity cycles of insects that burrow or bore should seriously consider giving this a try. It's easy, it's informative, and it can also be entertaining. For example, we were once listening to a female at work in her burrow when a second female approached and entered the nest. About 20 seconds later we heard a flurry of vigorous buzzes (expletives deleted); within a few seconds the intruder reappeared at the nest entrance in full retreat and flew away.

Many people have contributed ideas, equipment, and enthusiasm to this project; we are especially grateful to Donald R. Griffin and various members of the geophysics group at Princeton. Supported in part by a grant from the American Philosophical Society.

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Ampulex on trees

by
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In **Sphecos 18** Arnold Menke reported that *Ampulex* males were seen on one particular tree in Costa Rica. It is of interest to know whether they were attracted by any exudate or sugary substance. In 1986 I caught *Ampulex* sp. and other wasps (e.g. Bethylidae) in Sumatra (Indonesia) by hand on trees and telegraph posts by smearing bee honey (an ancient technique also used by many hymenopterists I think). *Ampulex* and other wasps that do not fly so often or that do not visit flowers (known so far) are often difficult to capture with a net, but are well attracted to honey spots. Since I am most interested in live specimens for behavioral and ecological studies, hand captures offered undamaged material to me. When I tried to catch feeding wasps with my net they often escaped. Sometimes I was lucky to capture 4-6 specimens of one species in one hour, most males. What one needs is a lot of patience, especially when the weather is hot.

Another reason that males may aggregate on one particular tree could be that they are attracted by a "calling" virgin female. *Ampulex compressa* males are not attracted by nesting sites with virgin females and also do not "dig" or compete for virgins near a nest entrance (as reported for other sphecids such as *Bembix*, unpubl. laboratory experiment).

[The wasps that I saw on the tree in Costa Rica did not appear to be attracted by any kind of exudate (or any female wasps), nor did they appear to be feeding on anything; however I didn't examine the trunk closely (I couldn't reach it) - A. S. Menke]

Additional Records of New World *Pison*

by
Arnold S. Menke

Pison arachniraptor Menke

VENEZUELA, Amazonas: Cerro de la Neblina, Basecamp, 140 m, Feb. 4-12, 1984, Davis & McCabe, 1 female (USNM).

Pison chrysops Menke

COSTA RICA, Guanacaste Prov.: Santa Rosa Nat. Park, Feb./March, 1986, Janzen & Gauld, 1 female (BMNH). San Jose Prov.: Escazu, March 4-7, 1988, F. Parker, 1 female (USNM).

Pison cressoni Rohwer

VENEZUELA, Amazonas: Cerro de la Neblina, Basecamp, 140 m., Feb. 21-29, 1984, Davis & McCabe, 1 female (USNM).

Pison gnythos Menke

COSTA RICA, Guanacaste Prov.: Santa Rosa Nat. Park, March/April, 1986, Janzen & Gauld, 2 females (BMNH).

This record extends the known range of the species into Central America.

Pison krombeini Menke

COSTA RICA, Guanacaste Prov.: Santa Rosa Nat. Park, Jan./May, 1986, Janzen & Gauld, 19 males, 2 females (BMNH).

Pison pilosum Smith

COSTA RICA, Guanacaste Prov.: Santa Rosa Nat. Park, Feb./April, 1986, Janzen & Gauld, 6 females (BMNH).

VENEZUELA, Amazonas: Cerro de la Neblina, Basecamp, 140 m, Feb. 13-29, 1984, Davis & McCabe, 2 females (USNM).

Pisonopsis in Costa Rica (Sphecidae)

by
A.S. Menke

The genus *Pisonopsis* has a disjunct distribution. Two of its 5 species occur in Chile and Argentina, and the remainder are found in western North America including Mexico (Menke, 1988). Among some material sent to me by Colin Vardy (BMNH) for identification were two females of *Pisonopsis* collected in Costa Rica (Guanacaste Prov., Santa Rosa Nat. Park & Guancaste Nat. Park). These records extend the distribution of the genus well into Central America. These specimens appear to be *P. birkmanni* Rohwer although there are slight punctation differences between them and material from the US and Mexico.

Menke, A.S., 1988. *Pison* in the New World: a revision. Contrib. Amer. Ent. Inst. 24:1-171.

***Isodontia edax* (Bingham) (Sphecidae)**
by
A.S. Menke

This large wasp is known from very few specimens collected in Sri Lanka, India, Sikkim, Vietnam and China (Bohart & Menke 1976, Pu 1986). During a recent visit to the Bishop Museum in Honolulu, Hawaii, I discovered a female taken in Laos, Sedone Prov., Pakae, July 15, 1967. Tergum 1 was black, the rest of the abdomen was red.

Bohart, R.M. and A.S. Menke, 1967. Sphecid wasps of the world. 695 p.
Pu, Tiansheng, 1986. New records of Sphecids from China. Entomotaxonomia 8:8.

COLLECTING REPORTS

Spain 1988

by
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From 8 August to 16 September 1988 I was in Malaga, Spain working with Dr. Miguel Blanca Gómez, an allergist, collecting, identifying, and removing venom from the social vespids of the region. Most of our collecting was done in the mountainous rural areas in the provinces of Malaga and Granada.

As this was my first opportunity to collect in a rural area of Europe (as opposed to flower gardens in cities!), it was somewhat of a shock to me to see the extent to which the native vegetation had been obliterated by the cultivation of olive groves and vineyards which extended to well over 1000 m elevations in quite rugged terrain. However, it was quite impressive to see the little white villages perched rather precariously on some of the hillsides. In many of these villages we collected large numbers of *Polistes* and *Paravespula germanica*. We collected about 8 colonies of the latter; they seemed for the most part to be in hard soil behind rocks. (A couple others had to be abandoned when it became apparent they couldn't be exposed using a pick and shovel!) I should add here that the local residents of these villages seemed to be very willing to help us to the extent of doing much of the hard physical work and spending half the night (literally!), and were very reluctant to accept any money as payment. In some areas *P. germanica* was so abundant that a worker could be seen within every square meter, and having a picnic lunch proved to be a challenge! Although Miguel mentioned that he hadn't seen this species near the coast where he lived, I found a few within 150 m of the Mediterranean beach.

We also collected in the area known as "las Alpujarras" which are the small villages on the south slope of the Sierra Nevada in the province of Granada. We stayed with Miguel's in-laws in a house over 200 years old having 35 rooms located in the village of Mecina Fondales (ca. 1000 m). In this beautiful region it was possible to find *P. germanica* up to 2500 m but it was abundant to at least 2200 m. In a couple villages at around 1500-1600 m, *Dolichovespula sylvestris* could be found, and in one of them (Trevelez) we discovered a nest made within a wall of a house. None of the workers seemed to be aggressive as we were netting them near the entrance, but this may be due to decline this late in the season (13 September); a male of this species was collected on a flower along with several workers. Several kinds of flowers, mostly umbellifers, attracted *D. sylvestris*, *P. germanica*, several *Polistes*, and two species of *Bombus* (probably *lucorum* and *agrorum*, although I'm not at all certain about the latter). A species of mint also attracted *Bombus*.

Polistes dominulus is quite abundant in all areas we studied of less than 1600 m elevation, but *P. gallicus* makes up a certain proportion from at least the range of 550-1100 m. Occasionally, *P. nimpha* could be encountered as well as *Sulcopolistes semenovi* but these are relatively uncommmon (less than 1% combined). From 2600-3000 m in the Sierra Nevada *P. biglumis* was present; in fact, the males were especially common in some areas but difficult to capture as they would dart about the scrubby thorny vegetation. If one put a net over a bush, the wasps crawled downward to escape! I'm still not sure where *P. biglumis* was making its nests as the vegetation was not much more than 15 cm in height, few rocky areas looked suitable, and there were no buildings. The dark coloration of this species made it extremely easy to identify.

Paravespula vulgaris was only sparingly present at 1500-1650 m, in the same areas where *D. sylvestris* was found.

Our other collecting area was southwest of Ronda (in the province of Malaga). In this area, at an elevation of 600-650 m, are many cork oaks (*Quercus suber*) which are hollow, providing nesting sites for *Vespa crabro*. I was told that the hornet is found nowhere else within several hundred kilometers. The men who strip the bark from the trees are eager to get rid of the nests, and one man, a beekeeper, was destroying colonies of hornets because he was afraid they would attack his bees. Fortunately, he hadn't killed many of them yet and was willing to locate them for us. It seemed there was a nest every couple hundred meters in some areas, and a few other species of trees were used for nesting sites, including the chestnut *Castanea sativa* and the common "encina" *Quercus rotundifolia*, the latter being one of the most abundant tree species over a wide elevational range in most of the regions in which we collected (at least where they hadn't been destroyed!). The insects were easily netted by swinging a net back and forth a few feet in front of the entrances, taking advantage of their rather ineffective defensive behavior (although we always wear protective clothing while doing this as they will "dive bomb" at times!), and we obtained over 1500 in one day from several colonies of various sizes. *V. crabro* there seems to average slightly smaller than those I've collected in the United States, and the gastral bands of the Spanish insects were narrower. I must admit that those from Spain seemed to be somewhat more aggressive than those from America as the former could often be seen stinging the folds of the net, which I've rarely seen in the US. The "clicking" of the mandibles could be heard when we netted the workers. We collected one nest having 4 combs.

I was fortunate enough to have a chance to see the Spanish fir, or "pinsapo" (*Abies pinsapo*) growing in the Sierra de las Nieves southeast of Ronda. This is a beautiful symmetric tree of very limited distribution. In the Sierra Nevada, patches of snow were still visible, and much of the alpine vegetation was thorny. Down near the coast one could see the scrub palm (*Chamaerops humilis*), an indicator of the Mediterranean Region, although pressures from urbanization threaten to destroy what agriculture has spared.

It is worth adding at this point that while in Union, New Jersey a couple days before leaving for Spain from JFK, I found *Polistes dominulus* to be more abundant in a lawn than anywhere we collected in Spain! In a recent letter, Chris Starr mentioned that this species has been found to be established in Newfield (Tompkins Co.), New York; Jim Carpenter told me that it is in Closter (Bergen Co.), New Jersey. I would find it interesting to hear of any other data on the distribution of this species in North America.

Kings Canyon National Park, California
by
Arnold S. Menke

In August I made another backpacking trip into the Sierra Nevada mountains. This time the objective was to reach the Ionian Basin in the upper section of Kings Canyon National Park, a remote region containing numerous lakes at about 12,000' feet and no trails. My companions on the hike were my son Kurt, his friend Linda Stephens, and my running buddy, Bill Rowe. The trailhead was at Courtright Reservoir east of Shaver Lake.

After three days hiking (16 miles) we reached Hell-For-Sure Lake just west of the park boundry on LeConte Divide. We decided to take a lay over day at the lake which permitted me to do some wasp collecting. I hiked from the lake (10,800') to the crest of the LeConte Divide (11,300+"), collecting along the way. This was all above timber line, and much to my surprise I found *Ammophila azteca* Cameron to be fairly common, even above 11, 000'. My experience on earlier hikes in other sections of the high country in the Sierra suggested that *Ammophila* did not occur above tree line, being replaced there by species of *Podalonia*. Around Hell-For-Sure Lake however, the two genera occured together. Other sphecids taken near the lake included *Crabro*, *Dryudella*, *Tachysphex* and two species of *Podalonia*. The common high altitude masarine, *Pseudomasaris zonalis* (Cresson) was found on its host plant, *Phacelia*.

The next day we went over Hell-For-Sure Pass (11,297') and trekked down into magnificent Goddard Canyon, camping at about the 10,000 foot level. The upper end of Goddard Canyon terminates at Martha Lake above which towers the massive black Mount Goddard (13,568'). We camped at Martha Lake (11,004') for three days, fishing for the delicious 14" trout that inhabit this large lake. Occasional specimens of *Ammophila azteca* were taken here, as well as two species of *Podalonia*, one *Crabro*, and *Pseudomasaris zonalis*. Again it was surprising to find *Ammophila* above timber line.

One morning we headed for the summit of Mount Goddard, a climb of some 2500 feet. This took us into the western edge of the Ionian Basin as we made our trailess way using a topo map as a guide. Getting to the top took four hours of slogging, the last couple of hours going up a steep slope on the east side of the mountain - literally rock climbing to get there. Our struggle to the top was amply rewarded by magnificent views of the entire Sierra from Goddard's tiny twin summits! Perhaps nowhere in the Sierra can one find a finer view point. To the south we could see Whitney, the highest mountain outside of Alaska, and all of the Sierra crest northward to somewhere south of Yosemite. To the east beyond the Sierra crest the White Mountains, and White Mountain itself, were visible. To the west you could make out parts of the coast range through the haze of the San Joaquin Valley. The top of Goddard is so small that one has an uneasy feeling while taking in the views. To the west, the summit drops off vertically over a 1000 feet to an ice field below. In other directions the slopes are precipitous and channeled by bone chilling chutes that make for very cautious viewing! To get from one of the tiny summits to the other, you have to carefully creep down and across some very narrow chutes and ridges - you suddenly realize that you are assuming the stance of a tree sloth, hanging on for dear life! Getting off the mountain was a simple matter of "boot skiing" down a gravely chute on the south side of the mountain - a fast means of "demounting". All of us will long remember and cherish the experience of Goddard.

After leaving the Martha Lake area, Bill and I decided to explore an interesting looking lake situated smack on top of the LeConte Divide: Lake Confusion. We rock scrambled up to the top of the divide and the lake. It is aptly named since it has apparent outlets on both sides of the divide, and it truly sits right on top of it. It is also very deep and has a beautiful deep blue color (but no fish). The elevation of the lake is 11,350' and I took examples of *Pseudomasaris zonalis* on *Phacelia*.

As our gasoline supply for the stove was running low, we were forced to head back down Goddard Canyon and make the horrific ascent of Hell-For-Sure Pass. The eastern approach is very long and steep and the pass is well named. In earlier days the trail went straight up to the pass without switchbacks - hence the name Hell-For-Sure. Altogether we were on the trail 12 days and covered about 50 miles.

Collecting In Libya
by
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I have visited Libya twice so far. The first time was for two weeks in March, 1982, when I was at the very beginning of my work in entomology. The results of the collecting was insignificant, but the experience was neverthelesss useful, the first contact with Africa was not easy to forget! The second trip was for three weeks in June, 1988.

As is commonly known, the LIBYAN ARAB PEOPLES JAMAHYRIA is quite a peculiar country in the Arab world in regard to various aspects of politics, public affairs, official and nonofficial rules and regulations, etc. Among other things, Libya is not an easy country to enter, particulary without some "normal" reason (tourism ex-

cluded) - and "normal" would have been difficult to apply to entomological research. I admit that I haven't even tried to establish any cooperation with the eventual local science institution, since getting information about anything (another big problem there) would cost me too much time. So I don't have any idea if there are any formal regulations on this activity (a permit, or something like that). Both times my trip to Libya was strictly private (family visit), and my collecting - illegal! I took advantage of my father's being temporarily engaged in Libya, through a Yugoslav consulting company - Highway Institute. It was very important for me to solve other major obstacles in organizing the field collecting in Libya: transportation and accomodations. In this country without tourism, hotels exist in only a few of the biggest cities, and no other kind of accomodation is available. Rent-a-car services are practicaly non-existent (actually, a car can be rented, but only illegaly), and public transportation is very bad and unreliable. Thus, all my activities completely depended on the help of others, kindly offered by the staff of HI and their partners in Libya - the Indian Road Constructing Company. I am very grateful to Mr. Milija Jovanovic and Mr. Dragan Popovic of HI and to Mr. Surya Prakash and Mr. Chrisna Svamy of IRCC for being so helpful and cooperative in these matters. Consequently, the my route was determined by their plans and accomodations.

I have seen most of the coastal area, from Zuara to Derna, but only a few other parts of the country, during several short inland visits to: Gharian-Ghariat-Darj-Nalut, Waddan-Socna and Mekhili-Cyrene-Beida. The vegetation of these areas differs from the other north African countries in lacking the typical Mediterranean zone (with the exception of the narrow elevated part of Cyrenaica, alt. 600-800 m). Most of northern Libya is covered by the various types of semi-desert vegetation, which usually reaches the coast. At about 50-150 km south of the coast, this semi-desert gradually turns into desert. In the more populated areas, like the coast of the Tripolitania region, free-growing olives, date palms, eucalyptus and some other Mediterranean-type trees are numerous, apparently as a result of irrigation.

I collected all along our route, but I had the greatest success at the following localities: Tripoli (and surroundings), Sabratha, Gharian, Darj, Maqrun (near Ajdabia), Beida and Cyrene. The main problem in both trips was that I could spend only a relatively short time collecting due to the travel limitations. In 1982, collecting was done only with a hand net, but last summer I was much better equipt: sweep net, aspirators, malaise traps, yellow pan traps, etc. However, some unexpected problems probably decreased the catch. I was unable to arrive in early spring as I had planned and the summer in Libya is not optimal for collecting as the high temperatures (45-55°C) and the completion of flowering by most herbs strongly reduce the activity of most Hymenoptera. High temperatures combined with high winds caused my aluminium malaise trap rods to bend and rolled my yellow pan traps on several occasions. The major problem with trapping is to find the rare suitable sites near some water or other source of humidity which will be secure enough from the always suspicious Libyans (especially when you trap illegialy). At this time of year, the most suitable collecting sites (except for trapping) were the ruins of the ancient Greek and Roman cities (apolonia, Cyrene, Leptis Magna, Sabretha), which offer lots of good nesting sites and sufficient soil humidity to support flowering plants during the summer months. These places are operated as tourist attractions, something quite rare in this country. The other sites that are relatively good for collecting were usually associated with the sanitary installations within the workers' camps of IRCC/HI. In these dry areas, the water from the baths and toilets (with its "additives") is often reused in small "irrigation systems": the water is transferred through short pipes directly into the sandy soil about 1 m below the surface, and then the soil is used for planting tomatoes, paprica, beans and other vegetables, which usually attract insects.

The main purpose of my trip was to collect Mutillidae, other "Scolioidea", Chrysidoidea and social Vespidae. I also collected other Hymenoptera, the most numerous of which were various apoids (particularly Halictidae), which also made the largest part of 1982's catch. Vespidae *s.str.* were not seen at all and seem to be absent from most of the Libyan coast. Mutillids were not very numerous (5 genera + *Apterogyna* sp., about 18 species, 90 specimens), but the record of the European *Ronisia brutia* from Cyrene was particularly interesting as I am studying that genus. I don't know if the record of *Bombus* from the same area, which looks like "*terrestris*" (1 female, 1 male), is interesting as well. The approximate list of the other aculeates collected is as follows: about 100 Chrysidoidea, 20 Scoliidae, 230 Formicidae, about 40 Pompilidae, 110 Sphecidae and more than 400 Apoidea. Those of you interested in the various groups should contact me at the beginning of 1990 (at my home address: Kumodraska 60, 11000 Beograd, YU).

During my stay in Tripoli, I visited the Natural History Museum, a nicely situated but quite small institution, founded by Italians some 50 years ago. As expected, after their famous "revolution", nothing was done for the benefit of the of the collections and scientific work here. Surprisingly, the condition of the remaining insect collection (I believe that the important part of the material was tranferred to Italy on time) is relatively good. The Hymenoptera, some 40 boxes, consists mainly of apoids, sphecoids, scoliids and ants. Unfortunately, I could not find anybody willing to talk about the possibilities of eventual cooperation in these matters.

Chile, 1989

by
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I made a 5 week trip to Chile in February, 1989 with my associate Bruce Miller. Whereas the main objective was to collect antlion larvae and other Neuroptera, fun time was had collecting wasps in Central and North Chile. Chile is a very safe and friendly place (at least before the grape scare) with exotic seafood, although a little more expensive than surrounding countries. We stayed at the Hotel City in Santiago which cost $30.00 a day but had nice rooms and a place to safeguard our rental vehicle (Class B - Avis about $1000 month with unlimited mileage). An excellent hotel and tourist guide was published by the telephone

company and should be bought in downtown Santiago at newstands. Phone numbers are in the guide for all hotels and the phones are cheap and good in Chile making hotel reservations easy.

About an hour from the capitol is the Reserva Rio Clarillo which is relatively undisturbed and has a small permanent stream with many of the typical chilean mediterranean type plants. A malaise trap was run for one month there and collected many aculeates including *Zethus dicomboda*, *Pison chilense*, *Astata* spp., *Anthidium chilense*, *Prionyx* spp., *Sphex latreillei* and of course too many of the annoying introduced wasps, *Polistes buyssoni* (from Argentina) and *Vespula germanica*. This latter species was the commonest wasp around and seen in most places in central Chile. Although winter 1988 was a dry one (about 30% normal rain), I had no trouble collecting 200 or more wasps in a day. These included *Stangeella cyaniventris*, *Ammophila* sp., *Heliocausus* spp., *Sceliphron asiaticum*, *Trachypus denticollis*, *Sphex latreillei*, *Bembix brullei*, *Zyzzyx chilensis*, *Oxybelus* spp., *Solierella* spp., and many bees. Numerous Eumenidae were present. The commonest is *Hypodynerus tuberculiventris*, but also *Hypodynerus chilensis*, *Stenodynerus* spp., *Hypalasteroides* sp., and *Zethus dicomboda*. Pompilids were especially common. This is a protected area and arrangements to go there can be made with entomologists at the Universidad Metropolitana de Ciencias de la Educacion (Raul Cortes; Christian Gonzales; Jaime Solervicens). Most of our trip plan was to collect the deserts on either side of the Atacama so that most of Central Chile and further southern forests were only briefly visited. Flowers abound as you go further south in February (we went south only to Chillan) and many bees are especially found at this time. Chile has a rather depauperate but very endemic wasp fauna but Apoidea (esp. Colletidae; Megachilidae) are fairly diverse there. Plumariidae were common at lights.

The Coquimbo Desert was on the dry side and little good collecting was made there although Neuroptera were abundant and quite exciting as we collected two Polystoechotidae, a new *Mantispa*, 2 nemopterids, and all of the antlions known, both as adults and larvae. Outside of the Santiago area, hotels are less expensive in general although $20/day for a double was common. Coastal areas appeared better and we collected a fair number of wasps at Tongoy, at the coastal sand dunes where the strange nemopterid *Stennorhachus walkeri* was flying. Many Thynnidae were present, some bees, and many *Bembix brullei*. For most wasp collectors the Spring (Sept. - Nov.) would be better, especially after a rainy year when the desert blooms. Good collecting was done at Huasco where *Baccharis* was blooming. *Helicausus* were fairly abundant as well as a few *Ctenochilus pilipalpis* (Eumenidae). Anyone from California would feel at home in Chile and although February is late in Central Chile, the abundant sweet temperate fruits (plums, melons, etc.) make for a delicious time.

The Coquimbo Desert becomes sparser and sparser as one approaches the Atacama Desert. The Atacama Desert by my definition is the area where no visible, naturally occurring life is seen. It goes from sea level to about 5000 feet and the only place we got rained on was in the Atacama at high altitute (at Calama). There is one exception to this which is striking and exciting. The most northern reaches of the Coquimbo desert are along the coast and at a place called Paposo where there is a fog zone and permanent water in the hills above the coast (Quebrada de Paposo, about 1700 feet.) Here there is abundant and varied vegetation with at least 5 species of cactus and many other plants. We were slightly late for this area as most aculeates were bees. One can stay at the Hosteria Taltal about 60 km to the south (Hosteria Taltal costs about $10 day/person - clean, on the beach, great seafood). This is a place everyone should visit.

The Atacama Desert is dismal to pass through (about 100 miles or so from Paposo to the Rio Loa which runs from Calama to Quillaqua). It is odd to think while being in the middle of the Atacama Desert that within 100 miles of this dead spot exists the most diverse desert faunas in the New World - The Coquimbo to the south, the Peruvian Coastal Desert to the North and the Argentine Creosote desert to the East. Also, we probably should be thankful that this superdesert has kept apart the northern and southern deserts of Chile which are 95% different in insects. Although we passed through the Atacama in the middle of summer and the middle of the day on a beautiful paved highway, it has a pleasant 80° F temperature which is due to the fact that most of the route is above 3000 feet.

The northern part of Chile is of great interest to collectors since elements of the Peruvian coastal Desert are found in lowland areas around river courses such as the Rio Loa in the south and the Rio Luta in the north. At higher elevations you find Precordillera biotas (the wierd 18 ft. cactus *Browningia* at 5000 feet), and the higher Andean faunas. Unfortunately we collected only one day at the higher elevation (about 10,000 feet) where wasps were abundant in the short day available (it always rained after 3:00 in the afternoon). At a place near Putre we found many wasps and bees on the flowers there. *Hypodynerus andeus*, *Ammophila lampei*, *Podagritus aricae*, *P. aemulans*, etc.

At the lower elevations the aculeate collecting is very limited. Most of the wasps were flying around the flowering shrub, *Pluchea chingoyo*. *Pachodynerus peruiensis* is everywhere except at Quillagua where a different species is found. The second most common wasp was *Trichostictia brunneri*. *Microbembix*, *Bicyrtes*, *Tachysphex* and *Prionyx* were found (see Porter, 1987. **Acta ent. Chilena** for an account of the Sphecidae).

One final note about Chile and that is the ecological success story of the Tamarugal. At the northern border of the Atacama Desert there once existed an extensive and unexpected natural forest of *Prosopis tamarugo* which supported a number of endemic insects including *Centris*. By the turn of the century this peculiar forest was nearly completely devastated, but a few years later concerned people began to replant it and have continued to do so until today with the result that there is again extensive forests. When you see it you think this is an artificial place since all the trees are in rows and one wants to drive on. But the native insects, animals and plants are there, albeit in a too ordered forest, and so it is worthwhile to study it. There is a research station at Fundo Refresco, about 20 miles south of Pozo Almonte. The people at the Universitad de

Tarapaca, Instituto de Agronomia at Arica (Hector Vargas) can make arrangements to stay there.

One strange anomaly of past biogeographers of Chile is that they extend the Atacama to the Peruvian border. This is only partially correct since the area embracing the Regions of Tarapaca and Antofagasta is a subregion of the Peruvian coastal desert and is Neotropical in contrast to Central and South Chile which is Neantarctic. However, the lifeless Atacama does occupy most of the area with the river basins containing nearly all the insect life.

Collecting in China

by
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This title is a misnomer. It turns out that in a month in China I collected not a single wasp, and only a dozen each of anthophorid and halictid bees (just fuzzy derived sphecids); and one stink bug for my spouse. I also saw several boring formicine ants that were casually investigated and discarded.

So why am I writing a trip report? Well, actually, China is a fun place to visit and has lots of wasps if you get a chance to collect. My problem was that I was the guest of a research institute involved in developing products derived from honey, pollen, propolis, royal jelly, etc. and nobody there was a biologist. Moreover, unlike the Japanese, I saw little interest by any of the people in insects and they couldn't understand why I was interested in those silly animals. So they humored me but did at least help me collect the bees. I also saw some really neat *Polistes* that were rather large, possibly *P. formosanus* or *P. olivaceus*, but I didn't have a net then and could not collect them.

I spent most of my time in Hangzhou, which is 100 km west of Shanghai. It is called "Heaven on earth" by the Chinese, and they are right. It is truly beautiful, especially in the spring or fall (summer is hot and humid), has the most famous lake in China (West Lake), is surrounded by beautiful mist covered hills, lacks cars and busses (but look out, there are 1,000,000 bicycles for the population of 1.5 million), and has the absolute best food in China. The food is really a treat, especially if you have eaten north China food (Beijing style), which consists mainly of grease cakes and other delectables, often with a burnt flavor. Oh, Beijing duck is famous and good, but this author makes a better Beijing duck than the most famous restaurant in Beijing (n = 1 sampling). Hangzhou also is the center of almost all of the art forms in China, with fantastic silks at a quarter of the price in the U.S., fragrant sandalwood fans, beautiful paintings and prints, and the best green tea in China (but it isn't cheap - up to $20 per pound for the very finest). The city is really fun to walk around in and the people are friendly. Chinese are polite and one is probably safer in China than anywhere else in the world. Many students speak English surprisingly well, considering how absolutely different Chinese and English are.

For a collector, China presents some unique problems. There is no corruption and, so far as I was aware, no special rules or permits pertaining to the taking of specimens; but there are paperwork and logistic problems. First, because Europeans simply cannot even hope to communicate on even a rudimentary level in Chinese (without lots of special training), it is absolutely necessary to arrange to have an English (or German, French, Spanish, etc.) speaker to accompany you. This must be arranged in advance. Also, the government will not allow foreigners into the country unless they are on a tour group (not conducive to biological studies) or are sponsored by someone in China, or are invited. Most independent visitors have relatives in China (that is the easiest), or else very close friends. To be invited as I was is the best way. When invited by a chinese government agency, a university, or a company, most of the details are arranged for you. However, under these conditions, you are often a "guest of the state" and appropriate behavior is expected (that is what mainly limited my collecting). Protocol, ceremony, and behavior are very important in China and should be taken seriously; but don't let this bother you - most of it is really fun. Also, learn to "go with the flow" at whatever pace you are going.

If anyone wants to collect in China, I recommend that a hymenopterist in China be contacted to help sponsor the trip. China has several good hymenopterists listed in the membership directory of **Sphecos**. Although I was sponsored by the Province of Zhejang, I did get an opportunity to visit Beijing where I was fortunate enough to meet Prof. Lee Tie Sheng of the Beijing Institute of zoology (7 Zhongguancun, Haitien, Beijing; tel 2562719). Prof. Lee Tie is not only an excellent vespologist, but also extremely friendly and helpful. He is on the organizing committee for the International Congress of Entomology which is to meet in the summer of 1992 in Beijing. He welcomes hymenopterists to the meeting and I'm sure will be most helpful in arranging plans for those of us who wish to attend that always worthwhile meeting,

A note on money and cost. China runs on renminbi (RMB) which is not an international currency and cannot be used outside of China (or exchanged anywhere except in China). Foreigners are exchanged "tourist money" (waihuijuan) which are identical to local RMB except they also have English and expire at a given date. Theoretically all foreign transactions must be in this money and not RMB. In fact, most of the tourist facilities, attractions, and tourist stores refuse (by state rules) to accept RMB from foreigners. This dual currency (no foreign currency is legal tender in China) can be a pain, but it can also be looked upon as an opportunity. Many, many Chinese young people want to come to North America or Europe to study and, strange as it seems, one of the major stumbling blocks is getting western currency to pay for the language and proficiency exams. Although it is not officially sanctioned, it is a nice gesture to exchange some of your money with the people who have been so personally helpful. They will give you RMB in trade (the black market is about 1.8 real RMB to 1 "tourist 'RMB", but I refuse to take any more than the "official" exchange or 3.71 to the U. S. dollar). Such trading is a double-edged sword - you now have hard to get rid of RMB - but also you have a chinese friend and "guide" who will help you interact in stores that take RMB (the prices are generally a little lower in these) to buy really nice things that might be impossible to get otherwise. Don't exchange with strangers ("changa money" pests who bother you near

every hotel) for several obvious reasons. The government plans in the future to eliminate the dual money system, but as of this writing, they haven't.

All in all, China is a place well worth visiting and has some excellent collecting. The problems are minor compared to some other (unnamed) nearby countries in Asia, but some planning is necessary. Supplies and facilities in China are surprisingly good; so you need not go without or be uncomfortable.

Thailand, India, Pakistan

by
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The purpose of my trip was to collect specimens for a worldwide revision of *Gastrosericus*, a sphecid genus of about 50 species. It was undertaken during the driest, hottest part of the year, and field work was an uninterrupted torment. Generally, the countries are still little known in respect to their wasp fauna, surprisingly inexpensive for a western traveler, and defintely worth further exploring. An excellent source on information on them are guidebooks (Travel Survival Kits) published by lonely Planet Publications. I relied heavily on them, and so did most of the travelers I met. Now I wish to describe briefly the collecting sites, so that they can be used by others.

THAILAND (5 April-10 May 1989). I found it to be a hospitable, well-organized country. Traveling either by bus or by plane was comfortable, and tickets could have been obtained on short notice. The long distance buses are usually air-conditioned, and most of them have TV programs and cold drinks are served free of charge.

1. Phetchaburi. A locality 160 km S of Bangkok, near the base of the Thailand peninsula. A mountain covered with a dry forest and having several Buddhist temples is at the edge of the town. Everything was bone dry there, but several vespids were found at the entrance to a natural cave. A dry tree trunk discovered after some two hours wandering proved to be an excellent collecting spot, with *Ampulex, Carinostigmus, Trypoxylon*, and many other genera.

2. Cha-am is only 18 km south of Phetchaburi. From the bus stop, one of the boys who wait there for passengers with their motorcycles took me to the beach three kilometers to the east for just 5 bahts (about 25 cents). After several unsuccessful attempts excellent collecting spots were discovered in the bush that extend parallel to the sea coast. My first *Gastrosericus* were encountered there.

3. Kanchanaburi is the town where the famous Bridge over the River Kwai is. My favorite place to stay there is Sri Muongkarn Hotel. A single air-conditioned room with shower and an Oriental style toilet was 100 baht a night (or about $5). The best collecting site that I found was on the other side of the Bridge, including the riverbank.

4. Erewan National Park is one of the tourist attractions, famous for its many waterfalls and pools. One can go there from Kanchanaburi by a bus that leaves Kanchanaburi at 8.40 and returns in the afternoon. A good place for forest Hymenoptera.

5. Lam Ta Pen River valley, 5 km NW Lat Ya was one of the finest places for Hymenoptera. It is on the way to Erewan National Park. There is no stop there, but the bus slows down on a one lane bridge, and you can ask the driver to let you out. Coming back was a little difficult, but passing cars picked me up and brought me back to Kanchanaburi (the drivers refused to accept money).

6. Loei, in central north Thailand, is relatively little visited by foreigners, but can be reached by bus from either Bangkok or Chiang Mai. Several air-conditioned hotels and excellent collecting spots along the Mae Nam Lo River, an affluent of the Mekong.

7. Wang Saphung, a small town 20 km south of Loei, with minibuses going there every half an hour or so, with good collecting sites along the Mae Nam Lo River.

8. Phu Rua National Park, some 45 km W of Loei. A well preserved dry forest. Getting there can be a problem since the entrance is about 5 km off the main road. I collected in a dry creek, around one of the remaining water pools. Although I did not see any mammals, the scenery looked as if it was taken from Kipling's Book of The Jungle. I jumped up in alarm when a huge teak tree leaf fell down on the ground.

9. Chiang Mai and the nearby Doi Suthep mountain (now a National Park) are two classical tourist centers. Collecting sites were along the river in the town itself on the river bank (roughly opposite the American Consulate), and in a creek near the main temple on the mountain.

10. Ban Phe, circa 130 km SE of Bangkok is a small fishing port, and is also easily accessible by bus. The woods nearby should be full of insects during a less dry season. The adjacent Ko Samet Island is another tourist attraction because of its many splendid beaches. Excellent collecting spots on vegetation near the beaches in less-visited areas.

INDIA (10 May-18 June 1989). This is not an easy country for lonely travelers off the beaten roads. Buses, for example, have very little room inside, and the luggage area is on the roof (the passenger has to climb a ladder on the bus's back end, using one hand for support and carrying his trunk in the other); because buses are normally crowded, I had no control over the luggage at all. Nothing was lost, however. The Bombay slums are infamous enough, but a direct exposure makes a newcomer sick: the view of human misery, the lack of hygiene (e.g., the roadsides openly used as latrines), and the resulting stench.

1. Krishnagiri Upawan National Park is only a few kilometers from Bombay, and I used rikshas to go there (for the equivalent of $7, starting at 9 AM and staying there until 1 PM). Remarkably, the place is almost pristine in spite of the huge urban agglomeration nearby. There are several entrances, but I preferred the one next to Film City.

2. Udaipur. One of the main cities of Rajasthan, well known for its many palaces and a big artificial lake. I was impressed by camelcarts stopping at the traffic lights at the city's main streets. Not much room is left for insects on the lake's shores which are heavily used for grazing and washing clothes. One excellent collecting spot was in an orchard adjacent to Sahelion ki Bari palace, another on the Moti Magri hill, with males of *Prosopigastra* hovering in the sun very much like *Syrphus*.

3. Jaisamand Wildlife Sanctuary, about 5 km from the town of Jaisamand, a town which can be reached by bus from Udaipur. For the first time I saw groups of langur monkeys sitting on the road and only slowly moving away from the bus. Like most other places, the Sanctuary was bone dry, with many leafless trees. Wasping was fairly good, however, around some blossoming trees and bushes.

4. Mount Abu. The type locality for many species described during the colonial period (e.g., by Nurse or Turner), Mount Abu is the only hill station of Rajasthan. Crowds come there in summer to seek relief from the oppressive heat and to visit Hindu and Jain temples, e.g. the astounding Dilwara temple with its fantastic marble carvings. The dry ravine along the road to Dilwara proved to be the best wasp place, although the number of specimens was only moderate.

5. Deesa. Another classical type locality, a small town on the Banas River, in Gujarat State. I came there from Mount Abu, changing buses at Palanpur, but the best direct route is from Ahmadabad (a big city with airport). This is where I suffered most during my whole trip. Deesa has only one, non-air-conditioned hotel. The owner (a well educated man and an alpinist) offered me his best room (a Deluxe class). The stone walls and the stone floor were hot, the mattress was hot, and I woke up every hour or so during the night to pour water on me (no shower), and to lay back, all wet, for another hour. Only local, extremely spicy food was available (no meat or beer), because Deesa is not a touristy area, and Gujarat is strictly vegetarian. Presently, my daily meals consisted of some yogurt and bread in the morning and a few tomatoes and a few cooked potatoes in the evening. The only collecting area I found there was along the Banas river, starting under the bridge (I asked the riksha drivers to take me to Banas Pool, pool meaning bridge in Gujarati). Slowly dragging myself in the murderous heat (not a drop of water in the river) or helplessly laying in the acacia bush, I still enjoyed the habitat and its insects. Back towards the town, I could see the old British Army barracks (now used for stables), with the spirit of Colonel Nurse nearby.

6. Sasangir National Park. This is the only place in Asia where lions still exist. The number of lions is currently over 120 and feeding them must be quite a figure in the budget. The place turned into disaster for me because of an untimely cyclone. Rivers were pouring down from the sky, or rather moving horizontally in the gale wind.

PAKISTAN (18 June - 22 July 1989). Upon my arrival at Karachi, Professor Ahmad Manzoor of Karachi University, with whom I had established contact earlier, kindly introduced me to Mr. Mohammad Farook Ahmad, Director of the Zoological Survey of Pakistan. Mr. Farook, in turn, wrote letters of recommendation to directors of various national parks, authorized the use of a field vehicle (I had to pay for the gas and driver), and last but not least, delegated one of his assistants, Mr. Waseem Ahmad Khan, to guide me in the field. After the first two days I liked Waseem so much that I asked him to join me for the rest of the trip (naturally, paying for his expenses). Waseem, a graduate in zoology from Karachi University, is an intelligent man, a keen observer, and a very nice person, and I would like to thank him again for his guidance, the *Gastrosericus* and other wasps he collected, and the perfect organization of our travels.

1. Manora Island and Sandspit Beach. These two places are at the outskirts of Karachi and can be reached by city busses, although one has to take a ferry (or rather a small boat) to Manora Island. Here again, it was very dry and insects were scarce except for numerous *Gastrosericus*.

2. Malir River, at the eastern suburb of Karachi, was completely dry, too. I collected near the bridge at the town of Malir, taking a city bus from Karachi. The river bed had many bushes, grasses and flowering plants, was full of insects but not humans. One of the most impressive spots near Karachi.

3. Kirthar National Park, circa 150 km NE of Karachi, is a sandy and gravely area bordered by mountain ranges, and a rather remote area. Waseem, the driver Aleem, and I went there by a four wheel Toyota provided by the Zoologica Survey. We brought our own food and spent a night in one of the bungalows at the Park's Headquarters. The shower was a great relief (water pump, also used for irrigation, was activated by a camel). We had a moment of terror when two men armed with guns started banging at the door in the middle of the night, demanding to be let in. Fortunately, they were park guards who were not informed about our presence. Small gardens near the Park's Headquarters were real mines of rare aculeates, including two new species of *Gastrosericus*.

4. Quetta is another famous type locality for Hymenoptera from the Raj (= colonial) period. Waseem and I flew there from Karachi, and were able to stay at the Hazarganji Chiltan National Park some 20km SW from the town. Here again I would like to thank Mr. Muhammad Shaffiq, Divsional Forest Officer (Baluchistan Forest Department, Spinny Road, Quetta), for arranging our stay there. One signature in the guests' book drew my attention: just "Philip". It turned out to belong to the Duke of Edinburgh (Queen Elizabeth's husband). The Park, covering a mountain range and adjacent lowlands, is probably among the best organized in the world: fenced off and guarded by armed guards, with no grazing, and even the use of electric lights is not permitted in order to reduce the potential disturbance. No food is available there, but we hired a cook (the meals I had there were exquisite, e.g., sajji, or leg of lamb which is dried outside so that it can last for weeks and be taken on a caravan trip). I was surprised to find many sphecids that I previously knew only from the southern parts of the Soviet Union (e.g., Tadzhikistan). Some places were almost identical to what I saw in Tadzhikistan many years ago. An obvious conclusion is that the fauna of the two regions is almost identical, and that British and Russian authors must have created a number of synonyms by not coordinating their efforts.

5. Multan. A lowland town in Punjab. We went there by a night bus from Karachi, and this was another experience. The bus had a regular stop so that passengers could go to a mosque for prayer. The best collecting areas in Multan were on the sand along the Chenab River. An orchard east of the city was also productive.

6. Bahawalpur and Lal Suhandra National Park, in Punjab, are both in lowlands. The sand dunes along the Sutlej River (a few km west of Bahawalpur) are recommended for wasp

collectors. The Lal Suhandra Park, 35 km east of the town, is also worth visiting.

7. Faisalabad (previously known as Lyallpur) has one of the largest agricultural colleges in Asia. Here again, wasping was quite good on the many sand dunes at the town's outskirts.

Faisalabad was the last city I visited in Asia. Tired, weak, and sick but happy, I returned to Karachi, flew to Munich and London, and finally landed in San Francisco. Home, sweet home... Ten species of *Gastrosericus* were brought back, of which two are new and one was known from a single female described from India precisely 100 years ago. The number of specimens is over 400, more than holdings in any other museum. Does it mean that *Gastrosericus* are more common during the peak of the hot season? Finally, there are over 4,000 other nice, little known wasps and bees here also, waiting to be studied.

MUSEUM/COLLECTION NEWS

New Director of the Michigan State University Entomology Museum

by

J. Mark Scriber
(Dept. of Entomology, Michigan State Univ., East Lansing, Mich. 48824-1115)

After 35 years as curator of the museum, Dr. Roland L. Fischer has decided to relinquish the administrative duties and devote more time to teaching, writing and working with the collection.

The new director and curator is Dr. Frederick W. Stehr, effective 1 November, 1989.

We have a large collection of insects, spiders and other arthropods estimated to be in excess of 1.5 million specimens, and are anxious to make it available to the scientific community via loans, visits or other appropriate means.

Direct requests for loans, visits, or other matters to:

Dr. Frederick W. Stehr
Department of Entomology
Michigan State University
East Lansing, Mich. 48823-1115
Phone (517) 353 8739
FAX (517) 353 9581

The Smithsonian sphecid collection: a curation project and associated time data

by

Mary Jo Molineaux
(Dept. of Entomology, National Museum of Natural History, Washington DC 20560)

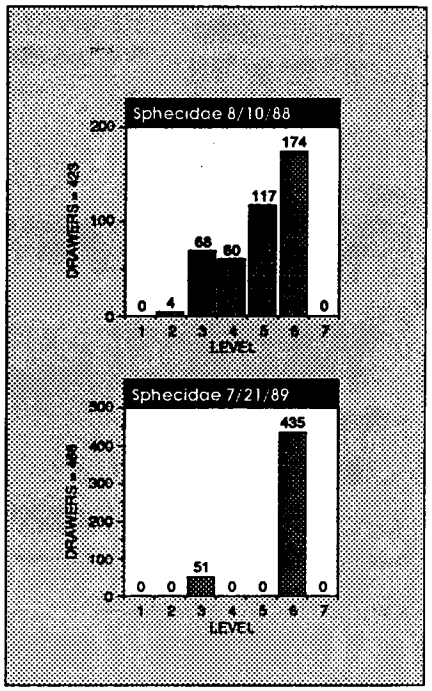
The Sphecidae collection at the Smithsonian Institution in Washington DC has become one of the two largest in the world thanks to the efforts of resident scientists (most recently Arnold Menke, SEL/USDA, and Karl Krombein, SI), as well as many donations and purchases through the years. The last complete curation of the collection of the collection occurred in 1968.

The recent acquisition of the very large Katsuji Tsuneki collection of Oriental and east Palearctic Sphecidae (approximately 40,000), has swelled the collection considerably. Karl Krombein was instrumental in obtaining this fine collection (see **Sphecos** 17:15).

It was decided that incorporation of the Tsuneki material presented an excellent time to upgrade the collection to Levels 3 and 6 of the Smithsonian Entomology Collection Standards (see McGinley, 1989, Entomological Collection Management - are we really managing?, **Insect Collection News** 2 (2):19-24). My responsibility was for all aspects of mechanical curation including name checking using Bohart and Menke's volume on Sphecid wasps of the world, as well as Arnold Menke's personal notes and corrections to the book. Menke resolved nomenclatorial problems and sorted unidentified material to genus.

This project was begun in February, 1988, and, on a part time basis, was completed during July 1989. A profile of the collectiojn was made on August 10, 1988, and upon completion of the project on July 21, 1989 (fig. 1).

Because of the size of this undertaking and the time involved, some useful statistics can be derived which



should be generally helpful in determining work hours for similar curatorial projects. The collection is now housed in 19 tall metal cabinets containing 526 drawers, of which 30 are empty and scattered throughout to allow for expansion, etc. The curation effort was confined to 435 drawers of material, and 51 additional drawers that contain material sorted to Level 3 (sorted to genus or other appropriate level). Given that the work was completed in 42 weeks, the average number of drawers curated per week was 10.4, about two per day.

Effects of the recent earthquake on the CAS entomology collection

by

Norman D. Penny
(Department of Entomology, California Academy of Sciences, Golden Gate Park, San Francisco, California 94118)

On Tuesday, October 17, 1989, at 5:04 PM an earthquake measuring 7.1 on the Richter Scale hit coastal central California. It was felt as far away as Nevada and northern Los Angeles. In the days that followed more than 3000 aftershocks were recorded, some of them registering more than 5.0 on the Richter Scale. Damage was extensive, with more than 55 people losing their lives and property damage calculated

at more than 6 million dollars. Most severely hit was the area around Santa Cruz and the San Francisco Bay area. Within the Bay Area one 50 foot section of the Bay Bridge gave way, and more than one mile of the elevated Nimitz Freeway in Oakland collapsed. In San Francisco, damage was most severe in the Marina District, with one fire destroying five buildings, and 40 others immediately declared unsafe for habitation. Only about two miles away in Golden Gate Park was one of the country's major insect collections - The Entomology Collection of the California Academy of Sciences.

Many of the Entomology staff were still at work at the CAS when the earthquake struck. Probably due to regular semi-annual drills, no one panicked, but everyone moved to door frames or under desks. Immediately afterwards, the staff was evacuated to a predesignated area in the park and not allowed back into the building until the next morning. When personnel were allowed back in, the damage report was very incouraging and gave very vivid visual evidence of the effects of earthquake preparedness. As the quake hit, four of the six compactor sections were closed for the night. A fifth compactor was partially closed during the first moments of shaking by the quake itself. None of the 20,000 drawers of insects suffered any damage at all. Although the cabinets of alcoholic material were shifted slightly on their bases, the only damage suffered were one jar and one loose vial of scorpions which rolled off a table in the preparation area, as well as one box of unsorted alcoholic material placed on top of a cabinet. Microscope slides were in boxes in closed containers, either cases or the compactors, and none fell over. The computer network and scanning electron microscope were checked, and no problems were encountered.

In striking contrast with the compactorized, pinned insect collection was the situation in the library, reprint storage areas, and office shelves. Books and boxes had fallen all over the floor, making it impossible to walk through these areas. More than 700 books had fallen off their shelves in the entomology library area, and more than 100 of them had damaged bindings. None of the other CAS collections experienced any significant damage either, except for faling books.

The fact that there was so little damage to the CAS Entomology Collection can be attributed, I think, to three factors. 1) The Entomology Collection is housed in a modern facility (built in 1976) which used the latest in earthquake engineering technology in its construction. The building is constructed on concrete pontoons over a substrate of sand. In a major earthquake these pontoons "float" over the shifting sand. Engineers found no significant structural cracks in this building after the quake. 2) The compactor system held drawers tightly in place. There was no room for the drawers to shift, and movement during the quake affected all drawers in the same way. The dramatic contrast between the books, which were not compactorized, and the insect drawers, which were, gave clear evidence of the value of this system. 3) The little ways in which the staff practised earthquake safety precautions paid off. Dr. Pulawski had a small string connecting his binocular microscope to the back of the counter. After the quake this string was taut, and the scope was perched at the margin of the work bench. As a departmental policy, drawers are not left out of the compactors in tall stacks overnight. Heavy objects are placed low to the floor, and only light objects are normally placed above shelves, etc. Where this was not done, a box of alcoholic material fell to the floor and was broken. At night the compactors are closed, and electricity turned off. Thus, if an earthquake strikes during non-working hours there will be no drawers sliding out of their slots, nor will there be the possibility of an electrical fire in the circuits.

These precautions should be taken by every collection in an earthquake prone area, and as recent news accounts suggest, earthquakes can strike in any part of the country. The value of compactors in minimizing the damage of earthquakes, both for collections and library materials cannot be emphasized enough.

[Reports from Berkeley, on the east side of the Bay, are that the California Insect Survey Collection was not harmed by the earthquake - edit.]

COMPUTER NEWS

Electronic mail system established for insect collections

by
Mark F. O Brien
(Insect Division, Museum of zoology, University of Michigan, Ann Arbor, MI 48109-1079)

Per the recommendations made by the attendees at the Systematics Resources Management in Entomology Workshop, Aug. 19, at Penn State University, I have established an e-mail group on the UM computer called ENT-LIST. ENT-LIST will be available to all people who can access me via INTERNET, BITNET, or Merit, and probably other networks that can tie into the UM computer.

What will ENT-LIST do?

It will facilitate the exchange of information among collection managers and those working with entomological collections. For example, once someone is a registered user, any message sent to ENT-LIST gets routed to all subscribers. E-mail can also be sent to a single person, too (to their computer address). Let's say you are looking for distributional data for a particular taxon. Send your request to ENT-LIST, and subscribing collections and individuals will get your message that same day! This is an extremely efficient way to get your message to a number of institutions.

How to get on:

Send me your Name and your (computer) mailname, for example:
JoeSmith, JSMTH@CORNELLA
That way I can register you as a member of the group. Send your message to me at:
Mark_OBrien@ub.cc.umich.edu; or
hcfb@umichub
When you are registered you need only to send your mail to:
ENT-LIST@umichub
[BITNET access] or
ENT-LIST@ub.cc.umich.edu
[Internet access]
Any messages sent to ENT-LIST will then be forwarded to all registered users.

Please do not attempt sending messages addressed to ENT-LIST until I have sent a message to you stating

that you are a member of the group. If you have problems using the system, or get error messages from the UM Postmaster, please relay them to me.

This is a pioneering venture for collections and me, too. Let's give it a little time to get things working properly. Your input will be greatly appreciated. Like any e-mail system, it will only be as useful as the amount of use it gets. If you are familiar with file transfers over BITNET or whatever network you use, it will be feasible to send entire files (species catalogs, supplier's lists, type information, etc.) to users that request such information. I will inform you when more features become available. As more people subscribe, ENT-LIST should become, within a few months, a viable communications link for collections and systematists in North America.

LITREF - A bibliographic referencing system

Robin Edwards sent in a flyer on this new system.

LITREF 6 is a personal computer database package intended for the storage and manipulation of literature references. It is a comprehensive and self-contained system which maintains information in a flexible and easily accessible form.

LITREF 6 is virtually unique in being able to import downloaded ASCII format files from almost any online database which permits downloading. As well as accepting data directly from the results of a mainframe search LITREF will also receive data from floppy disk or via the keyboard.

Information can be stored in any number of databases, so you can partition data on different topics. The use of multiple data bases also allows data to be organised in an extremely flexible form. The databases can be manipulated in a wide variety of ways; for example, the results of a search can be routed into a different or new database, or a database can be transferred via floppy disk for use on other machines running the package. Master databases can be updated from satellites in the same manner.

The facilities provided for data retrieval are extremely powerful, with rapid index searches under the author and keyword fields and a very flexible conditional search capability.

There is also a report generator that allows you to print out any number of records containing fields which you specify. This facility also includes the option to export reports to a text file for the production of bibliographic listings.

In speed and ease of operation LITREF has no peers. LITREF is menu-driven throughout, so operation requires the minimum number of keystrokes. It is not necessary to learn a whole new language, as many other systems demand - this is a feature particularly appreciated by people whose time is especially valuable.

LITREF will run on IBM PCs and all true compatibles, under the operating systems MS-DOS and PC-DOS. It has a memory requirement of 640K and like other database storage systems it is not recomended for use on a machine without a hard disk.

If you have any further queries please call me on 0928 35868. Alternatively, please write me at the below address and ask for the demonstration diskette. Also recommended is a software maintenance contract which will entitle you to future upgrades of LITREF, and full telephone support. Please quote the size disk required (5.25" of 3.5").

Mary C.A. Foley
April Computing Executive Ltd.
Chestnut Farm, Tarvin Road
Frodsham, Cheshire, WA6 6XN
England

"Belfrage", Texas

Gustave W. Belfrage was a Swede who emigrated to the United States and eventually spent many years in Texas (1867-1882). He was an ardent collector of insects and sold thousands of Texas specimens to museums in Europe and the United States (Nowell, 1975). Belfrage's material was simply labeled "Texas" and workers such as E. T. Cresson and A. S. Packard described many Hymenoptera collected by him. Type localities were usually cited as "Texas, Belfrage". To the uninformed, Belfrage was sometimes mistaken as a geographical site (Nowell, 1975)!

Geiser (1933) and Nowell (1975) have clarified just where Belfrage did most of his collecting in Texas. He arrived in Houston in January 1867, and he immediately set out to collect insects for sale to museums in order to earn a living. In mid 1868 Belfrage moved to Bosque County, Texas (northwest of Waco). From about 1870 to 1879 his home was near the hamlet of Norse in Bosque Co. Apparently most of his Texas insects originated here although he made one trip in 1869 to the Mexican border, probably near Laredo, and in 1870 he made a two month trip to west Texas. In 1879 he moved three miles from Norse to a hut that he built on Meridian Creek. He died there in December, 1882.

Belfrage was a prodigious collector and sold 10,000-15,000 specimens yearly to foreign institutions such as the British Museum (Nat. Hist.), and the museums in Brussels, Stockholm and Leningrad. The Smithsonian acquired Belfrage's remaining insects, some 36,000 specimens, after his death. It contained some of the types from Cresson's (1872) "Hymenoptera Texana" which was based in part on Belfrage's material. Some of Cresson's Belfrage types are in the Academy of Natural Sciences, Philadelphia.

A.S. Menke

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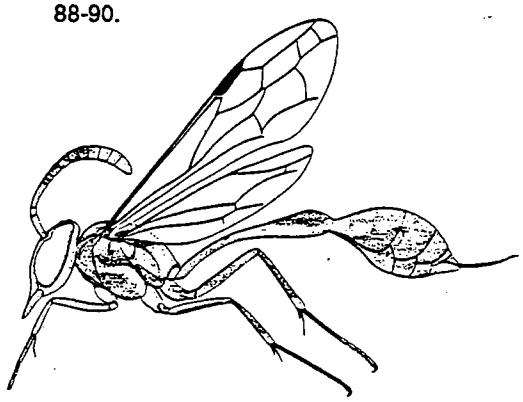

Liostenogaster nitidipennis (Saussure)

FUNNIES FROM SPHECOS

Over the past 10 years our beloved rag has contained various bit of humor. Here are two infamous examples. The first is from **Sphecos** 7:14.

Tales from the Outback

The discovery of *Aha ha* (Sphecidae, Miscophini)
by
Howard E. Evans
(Colorado State University, Fort Collins, Colorado)

Aha ha has now made the pages of **Science 82** (and in color, no less), thus catapulting to fame our own editor, Arnold Menke. So it seems worthwhile to put on record the discovery of that notable hymenopteran. It would be exciting to say that we arrived at the type locality after days of plodding through the Great Sandy Desert of Western Australia, drinking every third day from a fetid water hole, dodging the spears of irate aborigines. And that a monument has been erected at the type locality, bearing the images of its discoverers and surmounted with a 12-foot likeness of *Aha ha*. But all of that would be slightly exaggerated.

In truth, Bob Matthews and I were wandering about not far from our living quarters in Kununurra, Western Australia, working up a sweat sufficient to justify an evening revelry over a pitcher of Swan Lager. We had been studying *Bembix* wasps, particularly a small, pale species that tended to swarm over the sand like so many wraiths. It was undescribed, and we later named it *Bembix moma*, *moma* being an aboriginal word for a ghostly creature. On a bank overlooking Lily Creek, on the edge of town, we found a second aggregation of these wasps, and promptly set about to study them. It was hot and dusty, and we thought of our colleagues back home in their air-conditioned laboratories, counting *Drosophila* or modeling protein molecules. But have they ever found an undescribed species preying on an undescribed genus?

Bembix moma is an unusual species, preying upon Hymenoptera as well as the more usual Diptera. I well remember the incident at Lily Creek. It was September 16, 1972, our nest number A449. I poured out the cell contents onto a sheet of paper, and there among the potpourri of flies, bees, and wasps, were these tiny beauties, their silvery pile glittering in the afternoon sun. "Aha" I said, and Bob replied "ha" rather loudly, though we had no idea Arnold had heard us on the other side of the world. (Must have been a quiet day at the Museum.)

And that's the end of the story. Unfortunately I don't recall the circumstances surrounding the collecting of *Aha evansi*, said to be a "larger, stouter wasp than *ha*", though with shorter volsellar setae. Thanks, Arnold. Immortality is such a comfortable feeling.

[I think Howard must have been drinking too much Swan Lager when he wrote this. My recollection is that while going over some sphecid material collected "down under" by Howard and Bob, I came upon a cute little gray wasp with strange tarsal ungues and exclaimed, "aha, a new genus". Eric Grissell, resident wit, who happened to be standing nearby observing the master, retorted with some skepticism, "ha". As to *evansi*, its larger size reminded me of Howard's waistline after he had consumed all that Swan Lager in the "outback" - Editor]

The following is from **Sphecos** 9:28; it also appeared in **Antenna** 9:2 (1985) and **Bull. Ent. Soc. Canada** for 1985, page 130.

Nuclearbombus*, new subgenus (or how to eliminate bumblebee subgenera and learn to love the *Bombus*)
by
Arnold S. Menke and James Carpenter

Fuzzy thinking Bumblebee workers have gesplitert *Bombus* beyond all reason. There are so many subgenera in *Bombus* (a veritable plethora) that it is now a case of not being able to see the forest for the trees (or is it setae?). One might call this the fuzz factor (i.e., do plumose hairs indicate featherbrains?). *Nuclearbombus* (synonym: *Atomicbombus*) is proposed here as a remedy for this sad situation because it will destroy all subgeneric names, leaving us with nothing but species groups, which, after all, is what these "subgenera" really are.

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* A response to a recent paper in the **Canadian Entomologist**, 1984, 116: 1051-1056.

NEW FUNNIES

US Air Ace, 65, shot down by Yellow Jacket

ALEXANDRIA, La. - William Whisner Jr., who shot down 24 enemy airplanes during World War II and the Korean War and was one of the Air Force's first two-war aces, died Friday at age 65 from complications of an insect sting.

"We thought it was ironic that a yellow jacket got him" Whisner's younger sister said Saturday.

A 30-year Air Force pilot, Whisner was credited with destroying 18 1/2 German planes in World War II.
[from a recent newspaper account]

"As ugly as a mud dobber"

A mud dauber is an insect that makes its home in mud cocoons in barns and outbuildings. The expression is used to indicate physical unattractiveness.

An entry from the book **A dictionary of the Queen's English** published in Raleigh, North Carolina by the Dept. of Commerce, Travel and Tourism Division [thanks to Chris Starr for finding this one!]

BIG BLUE BOOK ERRATA, PART 14

by
A.S. Menke

p. 181, RC, L 19 from bottom: *gennelli* is correct, not *grinnelli*. *Grinnelli* was a subsquent emendation. Change L 20 from bottom to: *grinnelli* Rohwer, 1911 (*Ceratophorus*), emendation.

p. 246, LC, L 21: 1961 is correct, not 1962.

p. 348, L 20 from bottom: *turbulentum* is correct.

p. 349, LC, L 25: change Argentina to Brasil

p. 379-380, 382: *Encopognathus* and *Entomognathus*: The Greek word *gnathos* is feminine, but under the Code, Art. 30a (iii), it is to be considered as masculine. Thus my errata in **Sphecos** 18:19 for "p. 382" is incorrect.

p. 489, RC, L 20, 22 from bottom: (*Miscothyris*) is correct, not (*Gorytes*).

PROFILE

Lee Tie-sheng
(Institute of Zoology, Academica Sinica, 7 Zhongguancun Lu, Haidan, Beijing, Peoples Republic of China)

[The following is excerpted from a letter to Chris Starr. Thanks to Han Xingguo for helping with the translation]

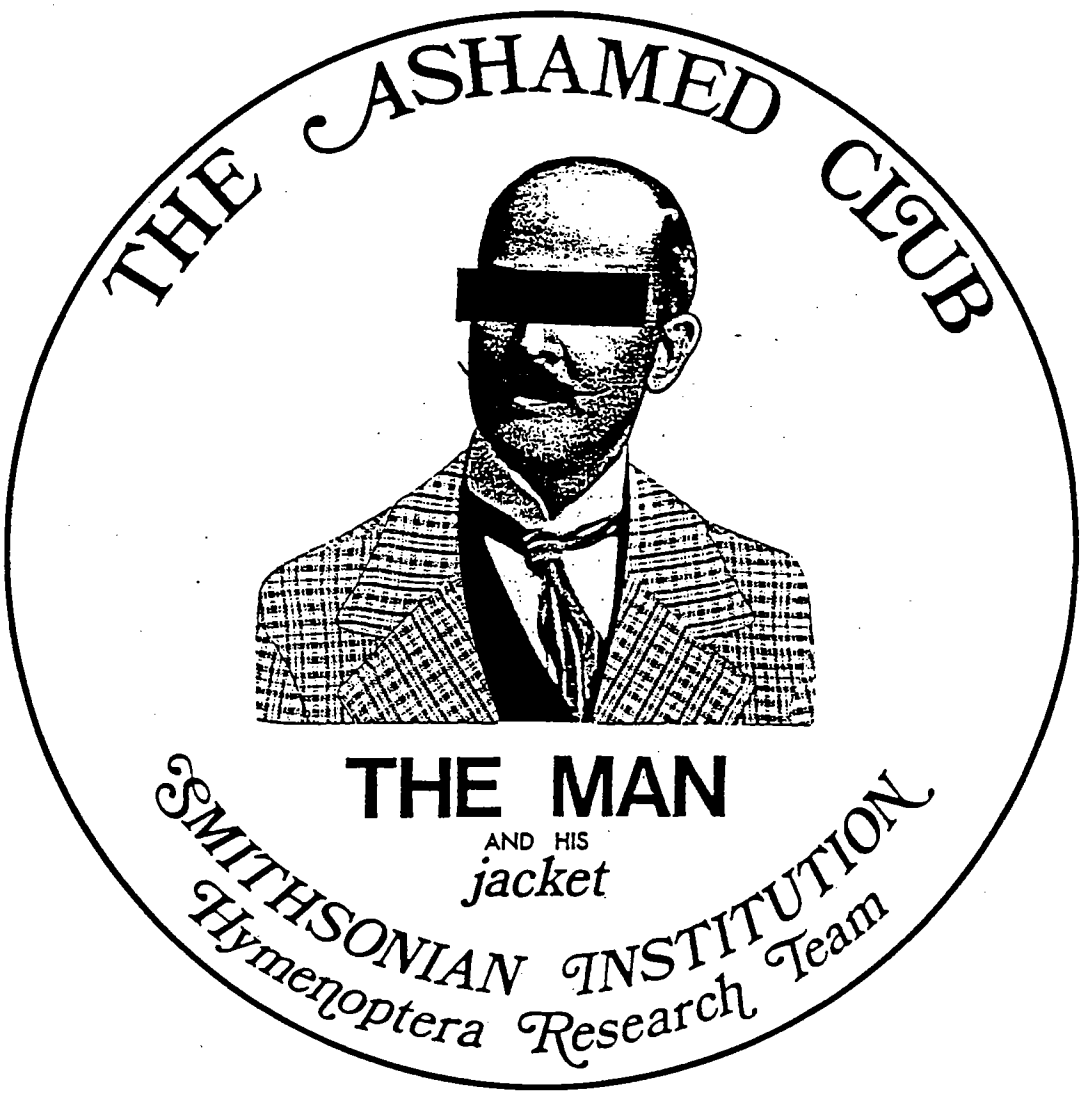
My principle scientific interests are twofold. First I have devoted a fair amount of research to biting midges. Among my publications on these are volumes 13 and 38 [of the Academica Sinica's **Economic Insect Fauna of China** series]. I have worked in many parts of China, both collecting specimens and doing biological investigations.

My other main interest is in biological control. In this, my research has focused on the use of vespid wasps against agricultural and forest pests, because they can effectively prey on many species of Lepidoptera. In order to make better use of vespids, I undertook some research on their bionomics and behavior. We have utilized four species in biological control: *Polistes chinensis antennalis, P. hebraeus, P. rothneyi grahami,* and *Vespula germanica.* In the course of 10 years we utilized this type of control over an area of more than 17,000 hectares, with satisfactory results. We were thus also able to lower the danger from pesticide use. Vespids have been put to similar use in some other countries, but as far as I know, never on this scale.

I have published some reports on this work in Chinese journals, but the complete results are not published. This type of research has since been discontinued, due to changes in cropping systems and a shortage of funding. Also it has been put into practice only to a limited extent.

ASHMEAD CLUB NEWS

The latest foray by this august body is in the form of a new seminar series at the Smithsonian Institution titled **Ashmead Club Seminars in Hymenoptera.** In leu of an honorarium, speakers receive an Ashmead Club T-shirt! So far Alex Rasnitsyn and Bryan Danforth have given presentations and are the proud (?) owners of AC T-shirts. For those of you planning visits to the Smithsonian, come prepared to talk and take home one of these fabulous and highly coveted shirts as a reward!



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(Compiled by Robin Edwards)

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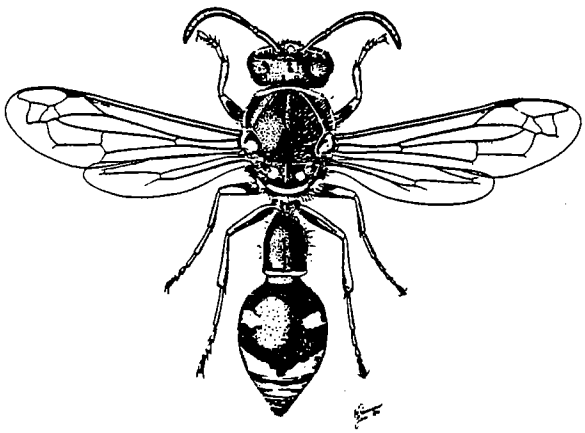

Eumenes pedunculatus (Panzer)

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