APRIL 1991

SPHECOS 21

A FORUM FOR ACULEATE WASP RESEARCHERS

MINUTIAE FROM THE MUD D'AUB

Still no official word from the old BMNH regarding personnel changes, but as of last November, Nigel Fergusson (a cynipoidist) was put in charge of Coleoptera. Nigel informed me that Tom Huddleston is now in charge of Hymenoptera. By the time you receive this issue of **Sphecos**, Mick Day may no longer be employed at The Natural History Museum (aka BMNH).

George Eickwort of Cornell University is the President-elect of the International Society of Hymenopterists. The Society's second quadrennial meeting is scheduled for August 11-17, 1991 at Sheffield, England. Many fine speakers have been lined up and this should be an excellent meeting (see announcement on page 27 of this issue).

Back issues of **Sphecos** are fast disappearing from our shelves. The only ones still available are 1, 3-6, 9, 10, 15, 18-20. Only a few copies of 1 and 3 remain. First come, first serve.

All copies of **Sphecos** 20 were mailed in September 1990, but those going overseas were sent by surface mail because of the high cost of airmailing. Some recipients experienced a very long delay in transit. Alex Antropov and Alex Rasnitsyn, both in the USSR, didn't get their copies of **Sphecos** until March of 1991! Did anyone else experience a similar long delay in receiving their copy of **Sphecos** 20? We may have to use airmail for some of our overseas recipients in order to get it to them in a timely manner.

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RESEARCH NEWS

Alexander V. Antropov (Zoological Museum of the Moscow Lomonosov State University, Herzen Street 6, Moscow K-9 103009 USSR) has described a new genus of Crabroninae from Brazil and has written a short review of the neotropical *Spilomena* including two new species. These papers are being published in journals which will be translated into English.

Richard M. Bohart (Dept. of Entomology, Univ. of California, Davis, CA 95616, USA) is proceeding with a revision of South American *Oxybelus* and so far has sorted out some 45 species, at least half of which are undescribed. He has two papers in press describing some new species of nearctic *Solierella*, and is finishing another paper on two new species of nearctic *Pemphredon*.

István Karsai (Dept. of Zoology, József Attila Univ., Szeged Egyetem u. 2. - Pf.: 659, H-6722 HUNGARY) has finished his PhD thesis on the community ecology of digger wasps on a mosaic-like sandy grassland in the Kiskunság National Park, Hungary. 90 species were found, with *Tachysphex psammobius* and *T. pompiliformis* being dominant. The "cursorial community" of digger wasps had a slightly uneven distribution while the "nesting community" had a more patchy distribution. Sphecid communities were more diverse on patches with relatively low plant diversity and cover. Diversity decreased in response to watering and watering combined with mechanical isolation and increased after removal of the upper layer of soil and plants.

Lynn Kimsey (Dept. of Entomology, Univ. of California, Davis, CA 95616, USA) reports "I am revising the wasp family Tiphiidae for the world, and have begun sorting all of our miscellaneous tiphiid wasps to genus and species. In addition, Dick Bohart and I wrote a monograph of the chrysidid wasps of the world, which will be published by Oxford University Press as of November, 1990."

Joan Krispyn (Gracewood State School & Hospital, Gracewood, GA 30815 USA) writes "My son and I have been working on a *Bembix* movie that is very pretty, though not incredibly penetrating."

Diomedes Quintero Arias (Smithsonian Tropical Research Institute, Tupper Building, APO Miami, Florida 34002-0011) reports that Roberto Cambra has completed a rough draft of "Catalog of Mutillid Type Specimens in the U.S. National Museum of Natural History," listing 285 holotypes, taxonomic changes, synonomy, etc.

Mamoru Terayama (Biological Laboratory, Toho Institute of Education, 1-41-1 Wakaba-cho, Chofu, Tokyo, 182

JAPAN) is preparing a monograph of the Bethylidae of East Asia.

Seiki Yamane (Dept. of Biology, Faculty of Science,Kagoshima Univ., Korimoto, Kagoshima 890 JAPAN) says "I have started to revise the Taiwanese Eumenidae with Dr. J. Gusenleitner, and recognize ca. 45 species on this not-so-large island."

OBITUARY

Henry K. Townes, Jr.
20 Jan. 1913 - 2 May 1990
by
David Wahl
(American Entomological Institute
3005 SW 56th Ave.
Gainesville, FL 32608)

The death of Dr. Henry Townes has left the entomological community much diminished. His influence, by published research and interaction with his peers, was enormous.

An appreciation of Henry's life and work was published in 1982 by V.K. Gupta (**Contrib. American Ent. Inst.** 20:1-14) and the interested reader is referred there for details. Briefly, Henry was born in Greenville, South Carolina, enrolled at Furman University (in Greenville) at the age of 16, and graduated in 1933 with a B.S. in biology and a B.A. in languages. His graduate studies were at Cornell University (1933-1937) under J.C. Bradley. It was Bradley who suggested Henry work upon Ichneumonidae; Henry's original interests leaned toward Chalcidoidea but Bradley discouraged him with the advice that chalcidologists ruined their eyesight and were prone to mental instability.

A number of jobs followed attainment of the Ph.D., including a fellowship at the Academy of Natural Sciences of Philidelphia (1940-1941) to work on a catalog of Nearctic Ichneumonidae. Employment with the U.S. Department of Agriculture in Washington, D.C., began in 1941 and he was assigned to work on Diptera, Orthoptera, Neuroptera, and aculeate Hymenoptera before being appointed as specialist on Ichneumonidae upon R.A. Cushman's retirement. In 1949, Henry left the USDA for North Carolina State University to work on insects attacking tobacco. Except for a two-year interlude as an adviser to the Philippine government on pests of rice and corn (1952-1954), he stayed in North Carolina until 1956. From 1956 to 1962 he received grants from the Dow Chemical Company to work on ichneumonid systematics. This opportunity came about through the influence of R.R. Dreisbach, a Dow chemist and amateur hymenopterist.

Henry and his family moved to Ann Arbor, Michigan, where his research and collection were initially associated with the University of Michigan. The collection and library were moved to a private collection building on the home property of the Townes' in 1964. The American Entomological Institute was established the same year as a nonprofit organization for the collection and library. Various grants were obtained from NSF and the National Institutes of Health during the 1960's; the research from these grants (and those from Dow Chemical) was published in 1959-1978 as three volumes of the **Bulletin of the U.S. National Museum** and ten **Memoirs of the American Entomological Institute** (including the four volume revision of the genera of Ichneumonidae).

From about 1933, Henry had been building up a collection of Hymenoptera (with special emphasis on Ichneumonidae) with the assistance of his wife, Marjorie Chapman Townes. In the late 1950's, Henry began using Malaise traps for collecting, both on his own expeditions and by supplying them to others to collect for him. By the late 1970's, the collection comprised more than 700,000 specimens of Hymenoptera and the question of what was to become of it and the library preoccupied the Townes. It was finally decided to relocate the American Entomological Institute in Gainesville, Florida, where it would continue its existance as a fully independent organization dedicated to systematics of Hymenoptera , with emphasis on the Ichneumonoidea. This move was made in 1985.

Henry was best known for his ichneumonid research. It is hard for the average hymenopterist to envision the chaotic nature of the group's taxonomy when Henry started in the 1930's. To call Henry's efforts "remarkable" is to damn with faint praise, considering that it took one person only 30 years to bring order to a group with over 60,000 species and approximately 2,800 available generic names. Either on his own or with the collaboration of others, Henry produced the aforementioned four volumes of the world genera, five catalogs of the world fauna (excepting the Western Palearctic), six volumes of comprehensive revisions of the Nearctic fauna of various subfamilies (with a seventh posthumous volume in preparation), and numerous smaller papers.

But Henry's contributions to systematic entomology did not end with ichneumonids. I would like to call attention to some other interests and innovations.

When Henry started his studies in the 1930's, many, if not most, workers relied upon the published literature for determinations, etc. Henry initially attempted to identify the Cornell collection's Tryphoninae in this manner but found many gaps and much confusion. He then began to travel to see types, to compare specimens from his own collection with them, and to make detailed notes on what he saw. This was, in his estimation, a good twelve of so years before this practice became common in North America.

Some of the readers of **Sphecos** may not be aware of Henry's work with Aculeata. During his USDA service, he cataloged the pompilid subfamilies Pepsinae and Ceropalinae, later revising them for the Nearctic. He later also revised the world Rhopalosomatidae. Henry always maintained a keen eye for aculeates and the American Entomological Institute's aculeate holdings are approximately 90,000 specimens from around the world. Pompilidae are especially well represented with 25,000 specimens. Taxonomy, however, was not the only area where he had influence on aculeate studies. During his North Carolina period, Henry suggested the use of *Polistes* for biological control in tobacco. His work with Robert Rabb was one of the first to intensively investigate prey preferences for various *Polistes* species and quantify their impact on prey populations. This laid the groundwork for the resulting large body of information about their biology and behavior assembled by other entomologists. At the University of Michigan, Henry was on the doctoral committee of Mary Jane West-Eberhard and worked closely with her.

While in Washington, Henry initiated the project to write a cooperative catalog of Nearctic Hymenoptera. With several of his colleagues in the U.S. National Museum and with the collaboration of a number of other specialists, this catalog was completed and published in 1951.

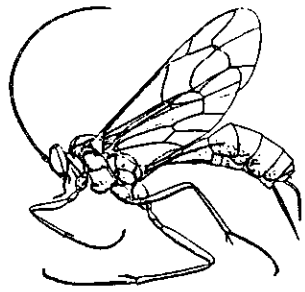
Henry's scientific work was exemplary and of high quality. To watch him ponder a problem was an experience: while his was not a photographic memory, he could recall the most minute details of a specimen examined 30 years previously. This capability was in no small way responsible for his success in dealing with a large and difficult group. Yet it was his personality and willingness to help others that made an equally strong impression on those who knew him. I first met Henry in 1978 when I was an undergraduate with a strong interest in ichneumonid systematics. On that occasion, and all others, Henry never failed to give perceptive and clear-cut advice. His willingness to help me in all facets of my studies, including supporting me in various postdoctoral proposals, was instrumental to my progress in systematics. Finally, it should not be forgotten that Henry was a master raconteur and joke-teller, with the sense of timing and delivery characteristic of natives of the southern United States.

A few years ago, Marjorie Townes prepared a short biography of Henry. I'd like to close with the last two paragraphs of her narrative:

"Over the years, particularly since the end of World War II, there have been real changes in the approach to and presentation of taxonomic research. Revisions are usually more comprehensive, and, if not covering the subject worldwide, at least take the world fauna into consideration. Interpretations of species and genera are based on the studies of types . . . . The format of revisionary publications has been modified to make them easier to use, with more illustrations more accurately rendered in drawings, photographs and scanning electron microscope photographs, with more thorough records of collecting localities and with maps to illustrate the distribution of species. . . . In many of these practices, if Henry has not been the pioneer he has been in the forefront of adopting them. With the specimens in collections the raw materials of the taxonomist, thorough sampling of a fauna has been facilitated by the use of the Malaise trap which was introduced in the USA after Henry had inspected the one developed by Malaise and modified the design for more practical demensions and construction.

"When Henry spoke of the Nearctic catalogue at a meeting of the Entomological Society of Washington in the mid-1940's, R.A. Cushman, then the specialist on Ichneumonidae at the National Museum, wondered how he had been able to accomplish so much in so short a time. This has been possible because of Henry's strong committment to become the best and because of his persistent and concentrated efforts to attain that goal."

Res ipsa loquitur.



Netelia leo (Cushman)
(Ichneumonidae: Tryphoninae)

MISSING PERSONS

Dr. Johan Billen of Brussels, Belgium.
Dr. Astrid Løken of Oslo, Norway.
Mr. Enrico Sismondo of Singapore.
Dr. Robert Wagner of Riverside, California.

NEW ADDRESSES

Josep Daniel Asis: Departamento de Biologia Animal (Zoologia), Fac. Biologia, Universidad de Salamanca, 37071 Salamanca, Spain.

Parker Gambino: Hawaii Dept. of Agriculture, Plant Pest Control Branch, 635 Mua Street, Kahului, Hawaii 96732.

Gregg Henderson: Dept. of Entomology, Louisiana State Univ., Baton Rouge, Louisiana 70803.

Bernhard Jacobi: Striepens Weg 2, 4330 Mülheim/R., Federal Republic of Germany.

David W. Johnson: 5797 Magnolia Lane, Vero Beach, Florida 32967.

Peter Kunz: Bettnanger Straße 8, D-7761 Moos 2, Federal Republic of Germany.

John Felton is completing his sojourn in The Netherlands and returning to the UK in April, 1991. He hopes to have more time for his Aculeate studies now that some other commitments are at an end! His new address is:

20 South Woodlands, London Road
Patcham, Brighton
Sussex BN1 8WU

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**. Please include your country code, as we don't always know what they are. These are placed in parentheses in the listings.

Barry Donovan, Christchurch, New Zealand: until June 30: (64) 03 252-074, beginning July 1: (64) 03 3252-074.

Robert L. Jeanne, Madison, Wisconsin: (1) 608-262-3322.

Natural History Museum (formerly British Museum (Natural History)), London, correction: (44) 071 938 8937.

Chris Starr, Taiwan, until mid-August: (886) 4-322-2290,
Ontario, Canada, 2nd half of August: (613) 995-1823,
Trinidad, beginning in September: (809) 663-9684.

Dr. A. Willink, Tucumán, Argentina: (54) 81-311462.

E-MAIL (BITNET) NUMBERS

Bob Jeanne suggested that we list BITNET numbers too, so we start off with his. Send us yours if you have one.

Robert L. Jeanne, Madison, Wisconsin:
jeanne@vms3.macc.wisc.edu (Internet)
jeanne@wiscmac3 (Bitnet)

PEOPLE IN THE NEWS

Dr. Ole Lomholdt, specialist in Hymenoptera - Sphecoidea and Curator of Coleoptera at the Zoological Museum, University of Copenhagen, has recently retired from his position due to increasing health problems.

Correspondence concerning loans of Hymenoptera formerly handled by Dr. Lomholdt, as well as requests for the return of material borrowed by Dr. Lomholdt, should be directed to **Dr. Børge Petersen**, Curator of Hymenoptera, Zoologisk Museum, Universitetsparken 15, DK 2100 København, DENMARK.

For private correspondence with Dr. Lomholdt, the following address should be used:

Dr. Ole Lomholdt
Rystien 10
DK-3300 Frederiksværk
DENMARK

Dr. Abraham Willink (Instituto Miguel Lillo, Tucuman, Argentina) will spend approximately 2 months at the U.S. National Museum of Natural History starting around May 1. He will be working on the South American species of the vespid genera *Pachodynerus* and *Hypodynerus*. He hopes to complete revisions of both genera.

HELP NEEDED

Query: Larval Sex

For the last several years we have been conducting extensive studies of genetic relatedness in social wasps using protein electrophoretic methods. For studies of inclusive fitness, it would be of great interest to determine the relatedness of workers to the larvae they rear, but there is a problem. Because the pedigree connections are different for males and females and because males and females have different reproductive values, it is fairly meaningless to estimate relatedness of workers to male and female larvae combined. Yet we know of no simple way to sex larvae. Since the accuracy of the relatedness estimation methods often requires running hundreds of individuals, we need a quick and easy method. Moreover, the method must leave us enough of each larva to run out on gels. Can anyonehelp us out?

David C. Queller,
Joan E. Strassmann,
and **Colin R. Hughes**

Department of Ecology
and Evolution
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USA

Mutillid Parasitoid of the Cicada killer?

by
George W. Byers
(Snow Entomological Museum
Department of Entomology
University of Kansas
Lawrence, Kansas 66045-2119)

This is a request for information. For many years, I have noticed activity of the large, orange-red and black *Dasymutilla occidentalis comanche* (Blake) in places where there are aggregations of burrows of the cicada-killer wasp, *Sphecius speciosus* (Drury). These observations, made in Lawrence, Kansas, span the years 1974 to 1990. In 1990, females of the mutillid were fairly commonly seen in early to mid-August, at the time males of the cicada-killer were competing for territories and observation perches. That is, the mutillids were most numerous (or most readily seen) before females of *S. speciosus* were observed and before the peak activity of cicadas in the area.

The mutillids were not observed either entering or leaving the burrows of *S. speciosus*; however, one female was seen standing at a nest entrance. A search of grounds near the nesting areas of the cicada-killer yielded no mutillids. There appears to be a perennial association of these two species of wasps.

No host has been identified for the western subspecies *Dasymutilla occidentalis comanche*. It is not difficult, however, to hypothesize that it is a parasitoid of the cicada-killer wasp. Bradley (1920) saw *Dasymutilla klugii* (Gray) (identified then as *Mutilla orcus* Cresson), a large mutillid about the same size as *D. occidentalis comanche*, going into burrows of *Sphecius grandis* (Say) at Langtry, Texas, and supposed there was a parasitoid-host relationship. *Dasymutilla o. occidentalis* (Linnaeus), the eastern subspecies, occurring generally east of the Mississippi River, has been reared from the nest of a bumble bee, *Bombus fraternus* Smith, in Georgia by Fattig (1943) and is probably a parasitoid of *Sphex ichneumoneus* (Linnaeus), according to Manley (1986).

Evans (1966) described many observations of the nests of the cicada-killer and many excavations of the burrows, but he made no mention of *Dasymutilla* or of any hymenopterous larvae in the brood cells other than those of *S. speciosus*. As natural enemies of the cicada-killer, he listed only the sarcophagid flies *Senotainia trilineata* (Wulp) and *Metopia argyrocephala* (Meigen). I have collected *Senotainia trilineata* at nest sites of *Sphecius speciosus* in Lawrence.

On several occasions, females of *Dasymutilla occidentalis comanche* were seen standing motionless or moving only slowly in clear areas among low shrubs at nesting sites of *S. speciosus*. This conspicuous behavior coupled with the striking color of the insects possibly serves to attract attention of the male mutillids flying over the area.

I would appreciate hearing from any readers of **Sphecos** who have made observations similar to these, involving this mutillid and the cicada-killer wasp. Perhaps we can interest some sphecid enthusiast in pursuing the matter further.

Acknowledgment: I am indebted to Donald G. Manley for his interest and assistance, particularly in pointing out characters by which the subspecies of *Dasymutilla occidentalis* may be differentiated.

Literature Cited

Bradley, J.C. 1920. (Untitled note in minutes of meeting of 22 May 1919, Ent. Sect., Acad. Nat. Sci. Philadelphia. Ent. News 31: 112-113.

Evans, H.E. 1966. The comparative ethology and evolution of the sand wasps. Harvard Univ. Press, Cambridge, Mass. 526 pp.

Fattig, P.W. 1943. The Mutillidae or velvet ants of Georgia. Emory Univ. Museum Bull. 1:1-24.

Manley, D.G. 1986. An aberrant female and possible new host record for *Dasymutilla occidentalis* (Hymenoptera: Mutillidae). Jour. Entomol. Sci. 21:367.

Polistes Distribution

Christopher K. Starr writes: "Swift and informative responses to my inquiry in the last issue embolden me to seek your help with another problem. I am very much interested in the factors which limit the geographical range of *Polistes*. As a necessary first step, I have started to formulate maps of where it is and is not. In North America the genus is represented at the northern edge of its range by *P. fuscatus* in the east and *P. aurifer* in the west, with apparent overlap in Saskatchewan and/or Manitoba. In the accompanying range map of this pair of putative sister-species, I have included only records which contribute to identifying its northern limit, omitting those far to the south and north. A filled dot indicates a positive record. An empty square indicates a negative record, i.e. a well-collected locality from which *Polistes* seems to be absent. And the dashed line represents my working hypothesis; this is the southern limit of the boreal forest.

"If you can contribute any records to this map, I would very much like to hear from you. As a rough rule, any locality within 300 km of the dashed line would be informative. The virtually blank area from Saskatchewan to the Great Lakes stands out, but let me also emphasize that I also have almost nothing from the vast area of British Columbia north of the Trans-Canada Highway. Negative records obviously must be handled with care. However, a good negative record is more valuable than a positive one, so please let me know if *Polistes* is conspicuously absent from any locality which you know well."

Division of Research
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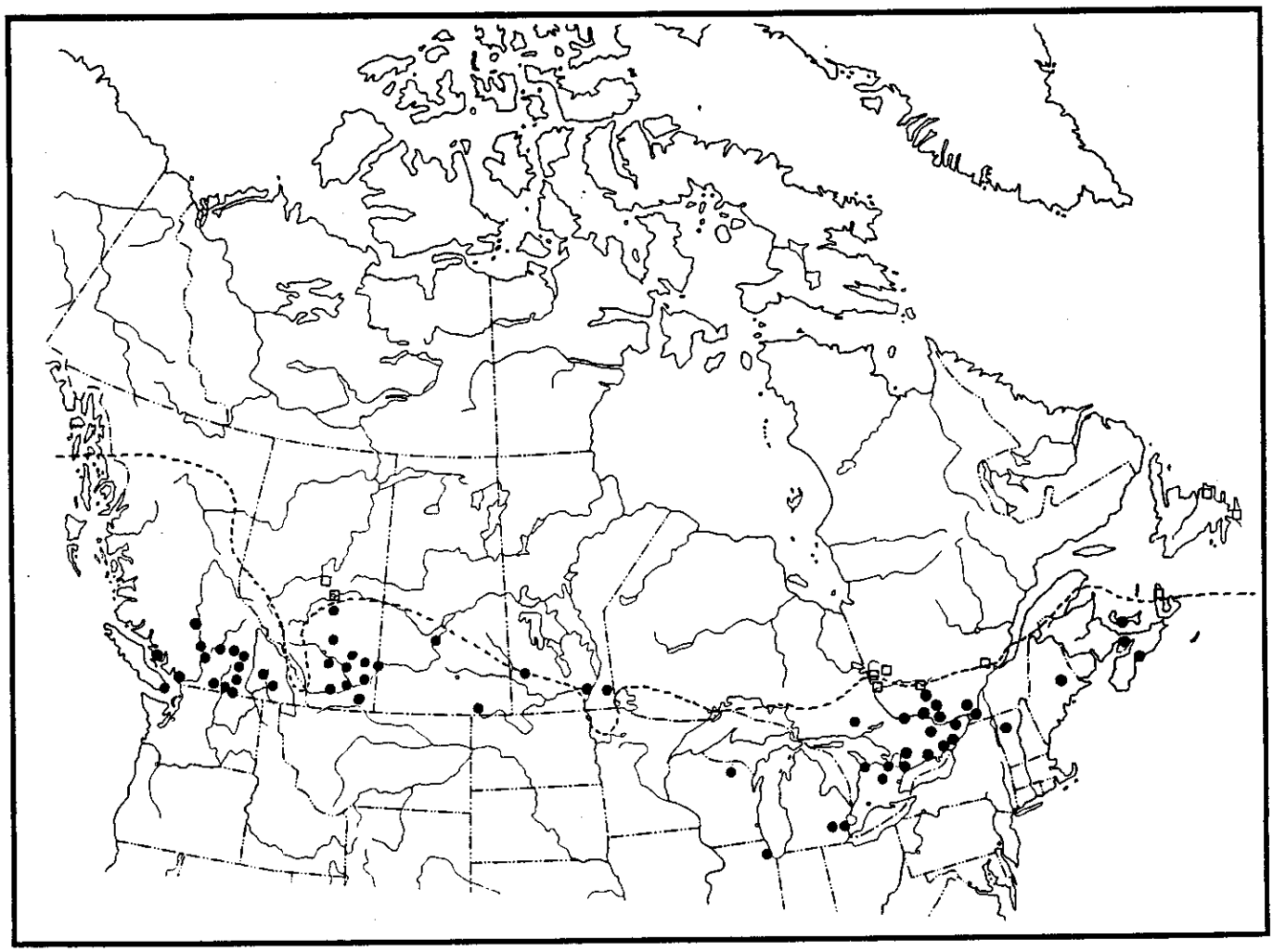


Cengizhan Özbay (Dicle Universitesi, Fen-Edebiyat Fakültesi, Biyoloji Bölümü 21280, Diyarbakir, Turkey) says: "I have been working on three projects involving Vespidae: distributions, karyotypes and blood proteins of vespids. I need any literature related to these subjects. Any help from Sphecos readers would be greatly appreciated.

MISCELLANEA

Notes from Bolivia
by
Chris Pruett
(Centro de Investigacion Y Meijoramiento de la Cana de Azucar, Casilla 2731, Santa Cruz, Bolivia)

In CIMCA's modest reference collection there are about 100 species of aculeate wasps and a similar number in the collection of the Natural History Museum "Noel Kempff Mercado" at the Universidad Autónoma Gabriel Reno Moreno (UAGRM), Casella 702, Santa Cruz. If any readers of **Sphecos** are interested I would be happy to send specimens from the collections for research purposes with the proposition that duplicate specimens from the collections can be kept by the researcher, whilst unique specimens should be returned. Species would be numbered for subsequent identification and labelling of specimens in the collections here.

I would prefer that any liason be made through my person because, even though I am lecturer at the University (Agricultural Entomology) and the only qulified entomologist working there at present, most visiting taxonomists/ entomologists are not informed by the Museum of the equally extensive collections available for study at CIMCA.

Concerning Sean O'Donnell's claim "Perú is arguably the most biologically interesting country in the western hemisphere"; if that is true then Bolivia must come a close second with most of the same ecosystems (absence of Pacific maritime and desert systems; additional presence of greater Altiplano diversity, salt lakes, fertile temperate zones, Precambrian shield and "Gran Chaco" systems) with some abrupt contrasts: in the Zongo valley, La Paz, one can drop from arctic tundra at 4,500 m to tropical rain forest at 600 m in 45 km!

JOURNAL OF HYMENOPTERA RESEARCH

The International Society of Hymenopterists is well on its way toward having its own journal. Dave Smith of the Systematic Entomology Laboratory, USDA, the reknowned sawfly expert and co-editor of the newsletter **Symphytos**, has accepted the altruistic job of journal editor. He will be assisted by four subject editors, John Huber, Mark Shaw, David Rosen and Arnold Menke. Their goal is to get out the first issue by early 1992, and it will contain mostly solicited mss. We have a lot of fine papers lined up and the following list of authors will give you some idea of the contents of issue one. Some titles are unknown or only approximate.

Alexander, Byron:
An exploratory analysis of cladistic relationships within the superfamily Apoidea, with special reference to sphecid wasps.

Askew, R.:
Hymenoptera profiles in temperate and tropical latitides with special reference to species diversities in the Parasitica.

Bohart, R. M.:
A synopsis of the genus *Oxybelus* in Middle America.

Brothers, D.:
Two new species of Plumariidae from S. Africa.

Carpenter/Brothers:
Aculeate phylogeny.

Gess & Gess:
Nesting ethology of *Celonites* and *Quartinia*.

Gess, F.:
A new species of *Celonites*.

Grissell, E.:
A revision of the genus *Perissocentrus* (Torymidae).

Kazenas, V.:
Biology and larva of *Entomosericus* (Sphecidae)

Kimsey, Lynn Sirl:
Functional morphology of the abdomen and phylogeny of chrysidid wasps.

Kurczewski, Frank E., Mark F. O'Brien and **Margory G. Spofford**
Nesting behavior of *Podalonia robusta* (Hymenoptera: Sphecidae).

Norden, Beth, K.V. Krombein and **Jonathan Steinberg**:
Mating behavior, male allometry and nesting biology of *Perdita (Hexaperdita) graenicheri* Timberlake.

Parker, F. D.:
Twig-nesting studies in Goblin Valley, Utah.

Pulawski, W. J. and H. Court:
Hingstoniola (Sphecidae: Crabronini).

Quicke, D.:
A comparative study of rectal pads of Hymenoptera.

Rosen, D., Y. Argov and **J. Woolley**
Biological and taxonomic studies of *Chartocerus subaeneus* (Hymenoptera: Signiphoridae), a hyperparasite of mealybugs.

Stoltz/Whitfield:
Symbiotic viruses of Ichneumondae and their phylogenetic implications.

Strassmann, Joan E.:
Subject to be announced, social wasp behavior.

Wahl/Sharkey:
Cladistic analysis of ichneumonoid families.

Several other people have indicated that they will contribute a paper, so the above list may be incomplete.

DELICIOUS AND NUTRITIOUS*

Having a party? Consider offering your guests an unusual and healthful party delicacy: raw yellowjacket larvae.

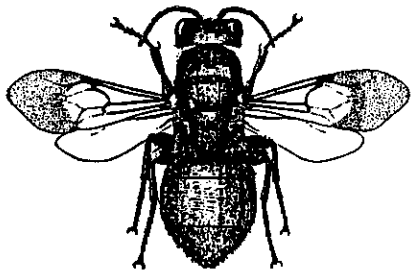
"The yellowjacket larva is the best insect I've ever eaten." said ESA member Douglas Whitman, from the Department of Biological Sciences, Illinois State University. "It's like eating a grape. When you first bite in, it's very tough, but suddenly, it explodes in your mouth with a sweet, nutty flavor."

*from ESA Newsletter 14(4):1.

PALEOENTOMOLOGY IN MOSCOW

Alex Rasnitsyn (Paleontological Institute, Acad. Sci. USSR, 117868-7 Moscow) reports: "The Arthropoda Lab has recently received significant support that will help promote the next generation of paleoentomologists. The problem has always been difficult here because of the usual absence of vacancies for paleoentomologists. It is especially difficult to solve now because of the general shortage of state funds. However, another effect of the changes experienced by the country during the last 6 years is the greater opportunity for international cooperation. For us this has resulted, among other things, in two Kuperwood Stipends in Paleoentomology provided by the Fund of Ecological and Social Harmony (Moscow) and sponsored by Kuperwood Enterprises (355 Bodwell Str., Avon MA 02322) through its Moscow daughter company Kuperwood Inc. We were lucky because the president of Kuperwood Enterprises, Mr. Eric Kuperwood, worked in the Lab as a technician for several months prior to leaving Moscow for the USA some 12 years ago. He recently told me that because of the of enthusiasm of the staff and the results of their research, he decided to support our team financially when he visited Moscow again, now as the president of a prospering company.

"The two vacancies, each generally for 5 years (providing the staff vacancies will appear before the term is over) are already occupied by two young magisters in entomology, one in beetles and another in chironomid and chaoborid midges. I hope that it will be possible to offer one of the next vacancies to a student of paleohymenopterology."



Omalus auratus (Linnaeus)

SCIENTIFIC NOTES

Preliminary Studies on the Taxonomic Value of Stridulation and the Stridulatory Organ in the Mutillidae

by
Jorge F. Genise
and **Roberto Straneck**
(Museo Argentino de Ciencias Naturales, Av. Angel Gallardo 470, Casilla Correo 220, Sucursal 5, 1405 Buenos Aires, Argentina)

The species of Mutillidae produce a distinctive stridulation under stress that is especially noticable when the specimens are handled by collectors. The sound is produced by a stridulatory organ consisting of a "scraper" (*plectrum*) on the underside of the apical border of the second metasomal tergum, which is rubbed against a "file" (*pars stridens*) on the base of the third tergum.

This note deals with the possible taxonomic value of the stridulatory organ morphology and especially stridulation under stress for specific differentiation and sex association.

Sounds were recorded from the following species: Argentina, Rio Negro, Bajo Santa Rosa: pairs of *Atillum stygium*, *Tallium fraterculum* and *Tallium* sp.; Argentina, Cordoba, Capilla del Monte: pairs of *Reedomutilla heraldica* and *Timulla* sp.; Argentina, Chubut, Peninsula de Valdes: pairs of *Reedomutilla heraldica*. The specimens were determined by Manfredo Fritz. The pair of *Timulla* was caught while mating in flight.

Recordings were made in the field with a Sanyo M1000 tape recorder. The specimens were brought close to the incorporated microphone while stridulating. A first analysis was made reducing tape speed in a UHER 4000 Monitor AV tape recorder. Among 50 recordings, those parts where stridulation was more rhythmical and strong were selected and separated for graphical analysis. We are indebted to Till Osten and Klaus Koenig from Stuttgart for the oscillograms and sonograms used in this study.

The illustrations of the *pars stridens* were made with a scanning electron microscope. The height, thickness, shape and order of the ridges were studied with the technique of topography by modulation on the Y axis.

a) Morphological analysis of the stridulatory organ (figs. 1-8)

The photographs obtained with the electron microscope show that in almost all cases the ridges of the *pars stridens* have similar height, thickness and distribution along the entire file. Only in the female of *Timulla* sp. are two parts distinguishable. The anterior part has thick ridges intercalated with thin ones and short longitudinal ridges; in contrast, the posterior part has regularly distributed ridges of similar thickness, as in all the other cases analyzed.

The topographic photographs show a great diversity of patterns, which cannot be correlated with the taxonomy of the group, or with sex. This diversity does not show, at this time, a direct relationship with the graphic analysis of stridulation; for example, in spite of the different morphological pattern of male and female files of *A. stygium*, the oscillograms are identical.

b) Sonographic analysis of the stress stridulation (figs. 9-12)

Contrasting with the morphological diversity, the sonograms obtained are in almost all cases identical. They show maximum peaks at 1.25, 2.5, 3.75 and 5 Khz and secondaries at 0.62, 1.67, 3.12, 4.37 and 5.62 without peaks above 6.25 Khz.

The exception is again the stridulation of *Timulla* sp., but in this case in both sexes, where there are also peaks at 6.25, 7.5 and 10 Khz.

Considerating these first results and the general bibliography of sound produced by insects it seems that sonographic analysis may not be important for taxonomic studies.

c) Oscillographic analysis of stress induced stridulation (figs. 13-20)

As in other insects the oscillograms resulting from stridulation show interesting differences based principally on periodicity, speed and the direction of rubbing. Although future work may demonstrate individual or intraspecific diversity it is possible now to distinguish very different patterns of rubbing which probably correspond to true specific differences.

Male and female *A. stygium* show identical oscillograms characterized by

unidirectional rubbing of low periodicity and speed. The oscillograms of *Tallium fraterculum* are similar but rubbings are short.

The oscillograms of *Reedomutilla heraldica* and *Tallium* sp. show bidirectional rubbing (the second movement is always less important) and high periodicity and speed.

Conclusive results would be obtained after exhaustive and statistical work which cannot be done by now, because we have no oscillograph available. However we believe that this note demonstrates that stress induced stridulation would be useful for taxonomic work and sex association in Mutillidae.

Fig 1, *Timulla* sp. (female) dorsal aspect of file (1000x); fig 2, detail of the anterior part (2000X); fig 3, *Timulla* sp. (male) dorsal aspect of file (1000X); fig 4, detail of ridges (2000X); fig 5, *R. heraldica* (female) detall of ridges (2000X); fig 6, *T. fraterculum* (male), detail of ridges (2000X); fig 7, *A. stygium* (female), detail of ridges (2000X); fig 8, *A. stygium* (male), detail of ridges (2000X).

Fig 9, sonogram of *A. stygium* (female); fig 10, sonogram of *A. stygium* (male); fig 11, sonogram of *Timulla* sp.; fig12, sonogram of *Timulla* sp., (male).

Fig 13, oscillogram of *A. stygium* (male); fig 14, oscillogram of *A. stygium* (female); fig 15, oscillogram of *T. fraterculum* (male); fig 16, oscillogram of *T. fraterculum* (female); fig 17, oscillogram of *R. heraldica* (female); fig 18, oscilogram of *R. heraldica* (male of Cordoba); fig 19, oscillogram of *R. heraldica* (male of Chubut); fig 20, oscillogram of *Tallium* sp. (male).

Sphecidae of Trinidad
II. Larrinae

by
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Larrinae is the largest subfamily of the Sphecidae in Trinidad, West Indies with over 45 species in eight genera. Species of *Pison* and *Larra* have been clarified by Menke (1988, in prep.), *Tachytes* by Bohart (1979), and *Tachysphex* by Pulawski (1974), but the taxonomy of several species of *Liris* remains a problem. Specimens are deposited in the National Museum of Natural History, Washington, DC. I am indebted to Arnold Menke and Woj Pulawski, among others, for help and advice.

LARRINAE

Larrini
- *Larra altamazonica* Williams, 1928
- *Larra bicolor* Fabricius, 1804
- *Larra godmani* Cameron, 1889
- *Liris anticus* (F. Smith), 1856
- *Liris rubricatus* (F. Smith), 1856
- *Liris* spp.
- *Tachytes amazonus* F. Smith, 1856
- *Tachytes chrysopyga* (Spinola), 1841
- *Tachytes excellens* Cameron, 1912
- *Tachytes fraternus* Taschenberg, 1870
- *Tachytes leprieurii* (Spinola), 1841
- *Tachytes pretiosus* Cameron, 1912
- *Tachysphex inconspicuus* (W.F. Kirby), 1890
- *Tachysphex iridipennis* (F. Smith), 1873
- *Tachysphex ruficaudis* (Taschenberg), 1870

Miscophini
- *Nitela amazonica* Ducke, 1903

Trypoxylini
- *Pison cameronii* Kohl, 1893
- *Pison cooperi* Menke, 1988
- *Pison cressoni* Rohwer, 1911
- *Pison duckei* Menke, 1968
- *Pison gnythos* Menke, 1988
- *Pison maculipenne* F. Smith, 1860
- *Pison pilosum* F. Smith, 1873
- *Aulacophilus eumenoides* Ducke, 1904
- *Trypoxylon albitarse* Fabricius, 1804
- *Trypoxylon capitale* Richards, 1934
- *Trypoxylon cocorite* Richards, 1934
- *Trypoxylon cornigerum* Cameron, 1889
- *Trypoxylon fabricator* F. Smith, 1873
- *Trypoxylon fitzgeraldi* Richards, 1934
- *Trypoxylon fuscipenne* Fabricius, 1804
- *Trypoxylon grenadense* Richards, 1934
- *Trypoxylon leucarthrum* Richards, 1934
- *Trypoxylon maidli bodkini* Richards, 1934
- *Trypoxylon manni* Richards, 1934
- *Trypoxylon moraballi* Richards, 1934
- *Trypoxylon nitidum* F. Smith, 1856
- *Trypoxylon pachygaster* Richards, 1934
- *Trypoxylon pectorale* Richards, 1934
- *Trypoxylon rubrifemoratum* Richards, 1934
- *Trypoxylon rufidens trinidadianum* Richards, 1934
- *Trypoxylon striatum* Provancher, 1888
- *Trypoxylon trinidadense* Richards, 1934
- *Trypoxylon urichi* Richards, 1934

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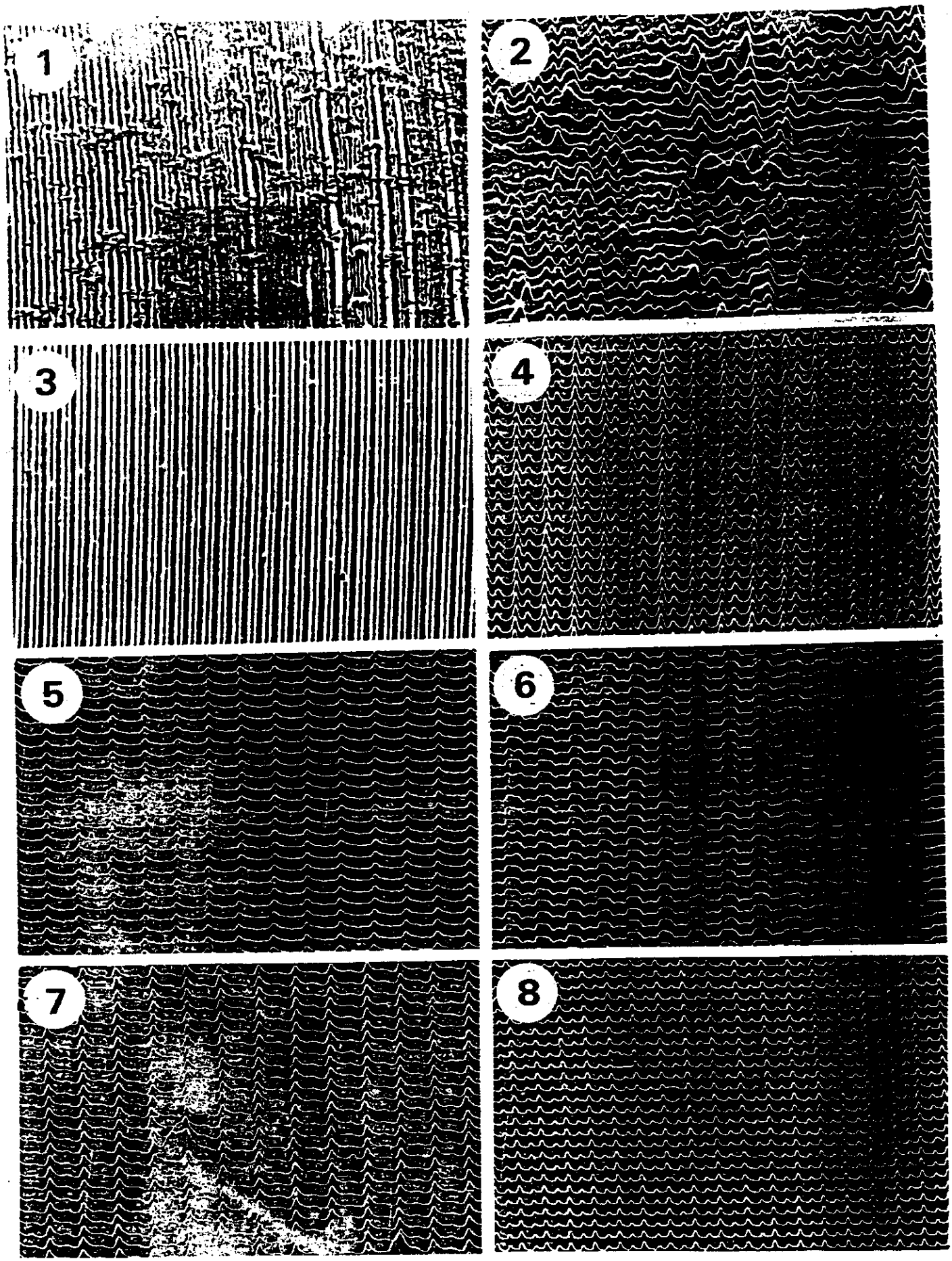
Sphecidae of Trinidad
III. Crabroninae, Nyssoninae and Philanthinae

by
E. McC. Callan

The subfamilies Crabroninae, Nyssoninae and Philanthinae are represented in Trinidad, West Indies, by 16 species, 15 species, and eight species respectively. As no less than nine genera of Crabroninae are now known from there, my early view expressed some 40 years ago that these wasps are poorly represented in Trinidad (Callan, 1950) must be corrected. I am indebted to the late Vernon Pate, who first examined my crabronines from Trinidad and named two species after me. Subsequently, I sent additional material to my friend Jean Leclercq, to whom I am grateful for includinq my records in his numerous important publicatlons on world Crabronini. Specimens are deposited in the Leclercq collection at Gembloux, Belgium.

Over 50 years ago Vesey-FitzGerald (1940) reported on Trinidad Nyssoninae, discussing three species of Bembicini and one species of Stizini. More recent papers include Evans et al. (1974) on *Rubrica nasuta* (Christ) and Callan (1977) on Gorytini. I am indebted to Howard Evans and Dick Bohart, among others, for their interest and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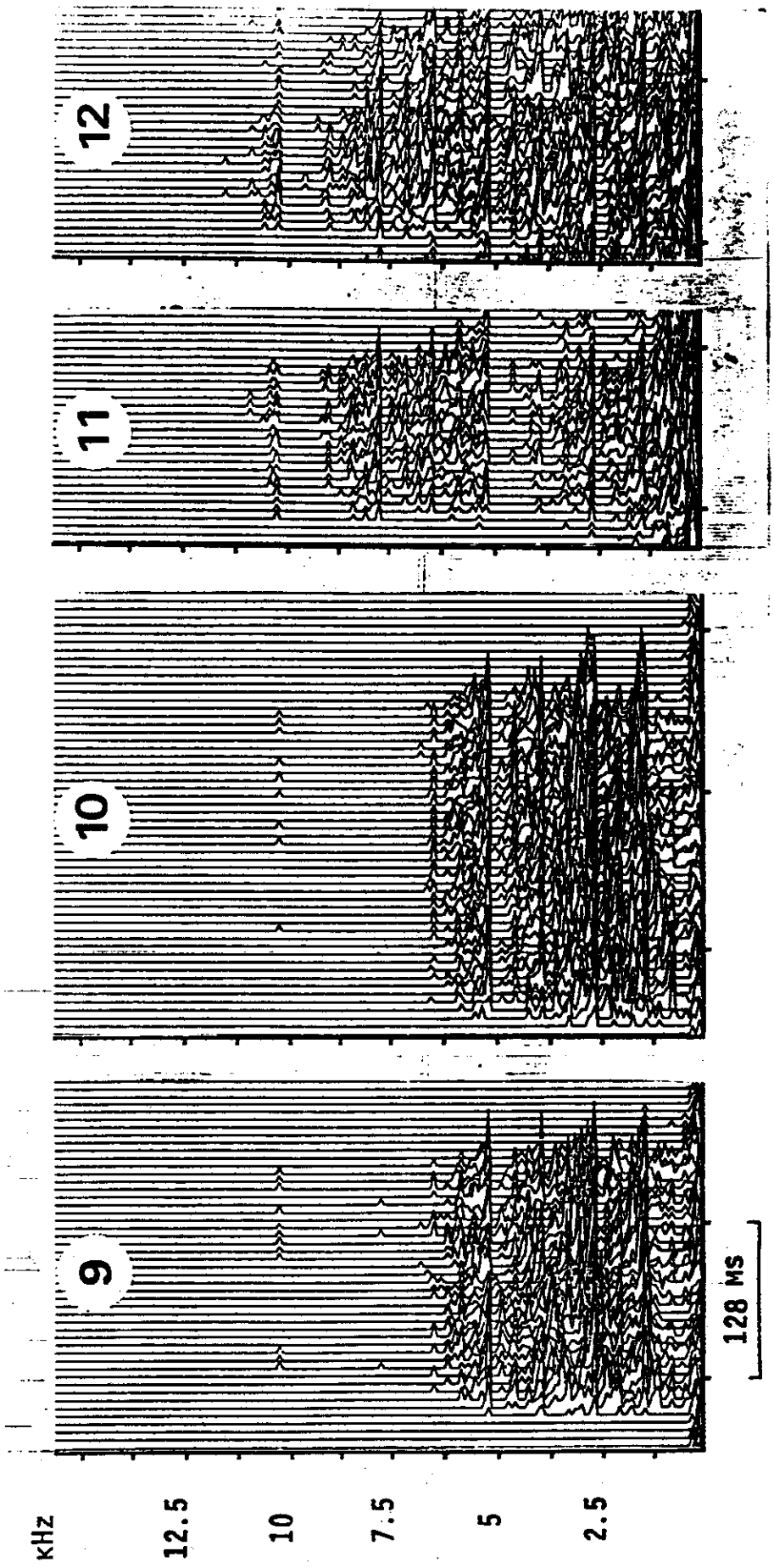
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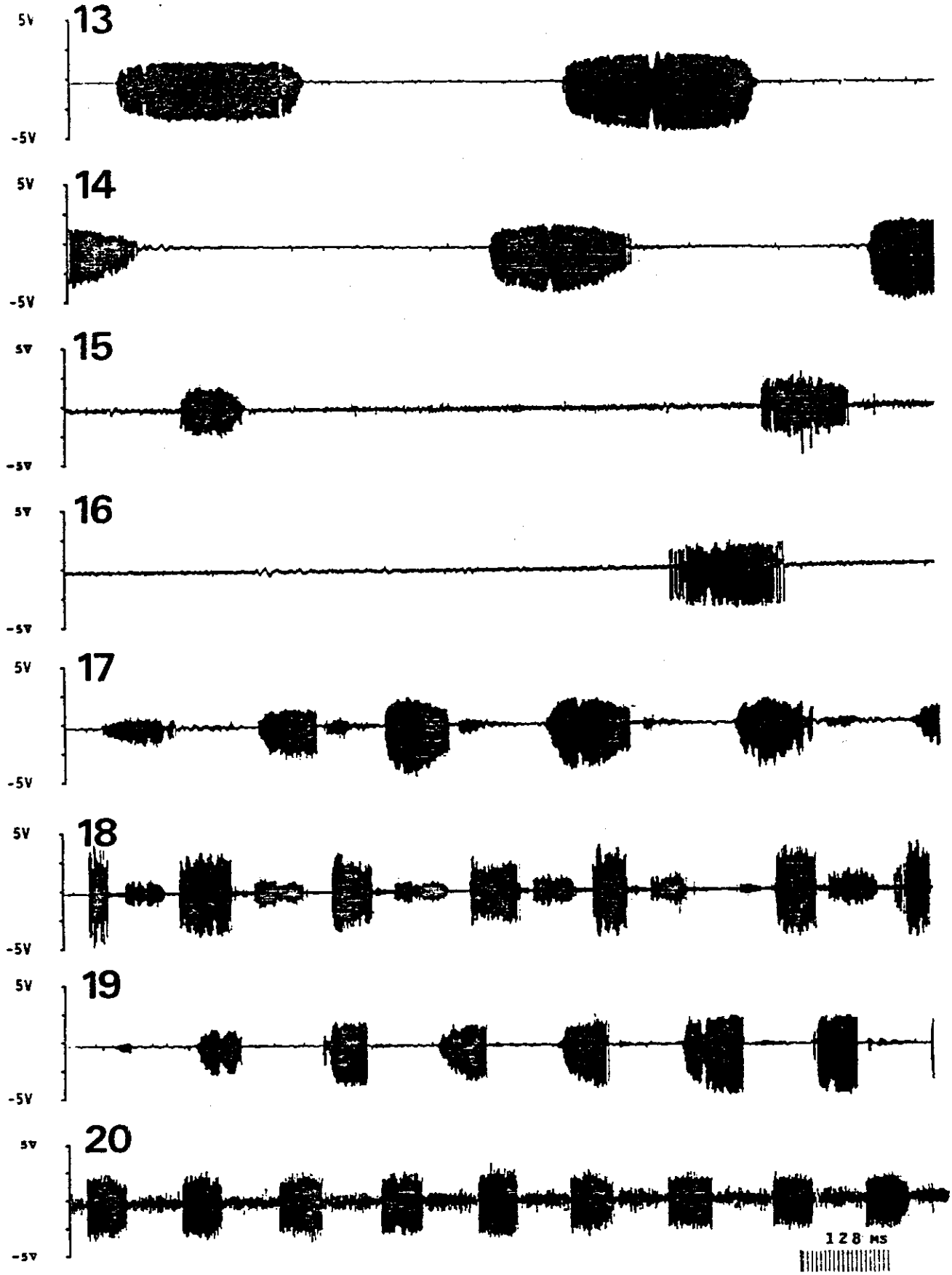
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advice. Specimens are deposited in the Museum of Comparative Zoology, Harvard University, Cambridge MA. *Microbembex* was reported erroneously from Trinidad as *monodonta* (Say) by Vesey-FitzGerald (1940, 1956). I am grateful to James Carpenter, who kindly examined my Trinidad material of *Microbembex* and informed me (1990, pers. comm.) that my specimens were determined as *ciliata* (Fabricius) by Dick Bohart. The present list provides an early opportunity to correct this longstanding error.

Philanthinae are represented in Trinidad by two genera, *Trachypus*, which largely replaces *Philanthus* in tropical America, and *Cerceris*. Recent papers include Rubio Espina (1976) and Callan (1990a, 1990b). Specimens are deposited in the National Museum of Natural History, Washington, DC. I am indebted to the late Herman Scullen, Karl Krombein and others for help and advice.

CRABRONINAE

Oxybelini
- *Oxybelus callani* Pate, 1943
- *Oxybelus polyceros* Pate, 1943
- *Oxbelus* spp.

Crabronini
- *Entomocrabro callanicus* Leclercq, 1980
- *Quexua ricata* Leclercq, 1955
- *Crossocerus callani* Pate, 1941
- *Enoplolindenius pugnans* (F. Smith), 1873
- *Foxita atorai* Pate, 1942
- *Foxita benitiana* Leclercq, 1980
- *Parataruma leclercqi* Kimsey, 1982
- *Ectemnius basiflavus* (Brèthes), 1910
- *Ectemnius carinatus* (F. Smith), 1873
- *Ectemnius centralis* (Cameron), 1891
- *Ectemnius semipunctatus* (Lepeletier & Brullé), 1834
- *Lestica constanceae* (Cameron), 1891

NYSSONINAE

Nyssonini
- *Epinysson zapotecus* (Cresson), 1882
- *Zanysson dives* (Handlirsch), 1887

Gorytini
- *Hoplisoides denticulatus hypenetes* (Handlirsch), 1895
- *Hoplisoides iridipennis* (F. Smith), 1856
- *Hoplisoides umbonicida* Pate, 1941
- *Hoplisoides vespoides* (F. Smith), 1873
- *Sagenista brasiliensis* (Shuckard), 1838

Stizini
- *Bembecinus agilis* (F. Smith), 1873
- *Bembecinus bolivari* (Handlirsch), 1892

Bembicini
- *Bicyrtes discisa* (Taschenberg), 1870
- *Bicyrtes variegata* (Olivier), 1789
- *Microbembex ciliata* (Fabricius), 1804
- *Rubrica nasuta* (Christ), 1791
- *Stictia pantherina* (Handlirsch), 1890
- *Stictia signata* (Linnaeus), 1758

PHILANTHINAE

Philanthini
- *Trachypus mandibularis* Rubio, 1976
- *Trachypus petiolatus* (Spinola), 1841

Cercerini
- *Cerceris binodis* Spinola, 1841
- *Cerceris callani* Krombein, 1972
- *Cerceris chiriquensis* Cameron, 1890
- *Cerceris cribrosa* Spinola, 1841
- *Cerceris dilatata* Spinola, 1841
- *Cerceris* sp.

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Rubio-Espina, E. 1976. Revisión del género *Trachypus* Klug (Hymenoptera: Sphecidae). Rev. Facult. agron. Univ. Zulia 3:7-87.

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Prey Records of Afrotropical Gorytine Wasps (Sphecidae)

by
E. McC. Callan

The gorytine wasps comprise the diversified tribe Gorytini of the sphecid subfamily Nyssoninae. Biologically they are relatively uniform, nesting in sandy soil and preying on Homoptera. In the Afrotropical region there are numerous genera, but prey records are apparently known only for *Harpactus, Pseudoplisus, Sphecius* and *Hoplisoides.*

Harpactus was shown by Pulawski (1985) to be the correct name for the genus *Dienoplus. H. rufithorax* (Brauns) and related species have been found in South Africa nesting in sandy soil and preying on Cicadellidae. In Madagascar I collected *H. histrio* Saussure nesting in sandy soil in upper montane rain forest at 1,800 m at Manjakatompo, Ambatolampy district with an undetermined adult cicadellid as prey.

Pseudoplisus preys on adult Aphrophoridae (Callan, 1980). I found *P. natalensis* (F. Smith) in South Africa nesting in the soil in flower-pots and preying on *Ptyelus grossus* (Fabricius). In Madagascar I reported *P. ranosahae* (Arnold) nesting in large aggregations in the ground and preying on *Ptyelus goudoti* (Bennett) (Callan, 1980).

Sphecius preys on adult Cicadidae. Evans (1966) quoted Arnold, who reported *S. milleri* Turner preying in South Africa on large cicadas of several genera, and Handlirsch, who recorded two species of cicadas as prey of *S. grandidieri* (Saussure) in Madagascar.

Hoplisoides has a predilection for preying on Membracidae, including records from the Neotropical region (Evans & Matthews, 1973; Callan, 1976), but preys also on Cicadellidae and Fulgoroidea. Membracidae do not occur in Madagascar, where Arnold (1945) recorded fulgorids as prey of *H. pustulatus* (Arnold). The nyssonine wasps *Hovanysson albibarbis* (Arnold) and *H. camelus* (Arnold) are endemic to Madagascar, where they are no doubt cleptoparasites of gorytine wasps such as *Hoplisoides.*

In South Africa Capener (1952) recorded membracids *Beaufortiana comuta* Distant (as *Centrotobelus braunsi* Capener) and a nymph of *Oxyrhachis* sp. as prey of *Hoplisoidea aglaia* (Handlirsch) at Willowmore, Cape Province. I found *H. aglaia* at Grahamstown, Cape

Province nesting in sandy soil and preying on an adult membracid *Xiphistes* sp. At Grahamstown I also found *H. thalia* (Handlirsch) nesting in sandy soil and preying on adult membracids *Oxyrhachis fuscicorinis* Germar on *Cytisus alba* and *Acacia mollissima*, and on adult *Oxyrhachis vetusta* Walker on *Wisteria sinsensis*.

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Mutillidae of Inhaca Island, Moçambique

by
E. McC. Callan

Inhaca Island lies at 26.01 S 32.58 E at the northern tip of the peninsula enclosing Delagoa Bay some 32 km from Maputo (formerly Lourenco Marques), Moçambique. It is a geologically recent inshore island about 11 km long and 6 km wide. Macnae & Kalk (1969) gave an interesting account of its natural history. Insects were collected by a student Ted Giddy and myself mainly from the sheltered west coast facing Delagoa Bay. Aculeate wasps are little known, apart from Mutillidae, Scoliidae (Betrem, 1971) and Sphecidae. Recently Krombein (1984) recorded a phas-matid egg-parasite from the island, *Alieniscus mutilloides* Krombein (Chrysididae), appropriately named in allusion to its superficial resemblance to certain slender mutillids. Many species of ants occur on Inhaca, the most interesting being the arboreal weaver ant, *Oecophylla longinoda* (Latreille), this being the most southerly record of this tropical species. Mutillidae taken on the island were first identified by the late Charlot Jacot Guillarmod, who died in 1979. I am grateful to Denis Brothers (1990, pers. comm.), in whose collection the Inhaca mutillids are deposited, for examining the specimens and updating and correcting their names.

SPHAEROPTHALMINAE

Dasylabris unipunctata Bischoff

MYRMILLINAE

Ceratotilla sp.

MUTILLINAE

Mutilla scabrofoveata Sichel & Radoszkowski
Smicromyrme rufisquamulata Bischoff
Smicromyrme sp.
Trogaspidia themis (Péringuey)
Trogaspidia vetustata (Bingham)
Trogaspidia sp.

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Additional Accounts of Defensive Stinging in Sphecid Wasps

by
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Previously, I reported two possible examples of defensive stinging in sphecids, that purportedly involved *Sceliphron* and perhaps *Trypoxylon* (**Sphecos** 18: 12). Since then, Justin Schmidt found a record of a *Sceliphron* sting that anaphylactically, actually killed a man (**Sphecos** 19:5-6). Given this latest information I thought it appropriate to relate two additional and unrelated stories of defensive stinging in *Sceliphron*, that I learned of this past year.

Accounts were freely voluntered during my first encounter with each informant (in the field), and without any cueing on my part, except to have already stated that I studied digger wasps (e.g. cicada killers, mud-daubers). At this point one man actually asked whether I was aware that "dirt-daubers" sting! Well, many sphecids have the ability to "sting", if you should hold them in your hand, but that is not the same as stinging to defend your nest.

Independent accounts ran about the same way - both men had been stung after they had inadvertantly disturbed some females at their nests - and in each instance wasps flew at and stung the perpetrators. One case had *Sceliphron* nesting near a door, which if allowed to slam would often draw fast pursuit by the wasps. The other account involved removal of metal sheeting that formed the roof to a shed. Evidently, *Sceliphron* nested under the sheeting and the disturbance caused wasps fly at and sting the man doing this chore. I can not recall if either man received more than one sting, but obviously these accounts sound very much like *Polistes*.

The men that were stung (at different localities in Central Texas) evidently knew *Sceliphron*, based upon their answers to my questions. There was no doubt in either man's mind as to what had actually stung them - "dirt-daubers"! I should add that these were rural men (one was a ranger at a nearby state park), in their early fifties, and they seemed to have this idea that "dirt-daubers" can sting defensively, in addition to the better known "red wasps" (*Polistes*).

Obviously, these stories will remain just that, until someone begins to piss-off nesting *Sceliphron* in a scientific manner. Of course, one would like to observe defensive reactions under varying nest densities. In any event, I have heard enough stories of defensive stinging in *Sceliphron* to suspect that it may be a candidate for documenting the use of the sting in nest defense by a sphecid wasp. Since I have no plans to follow any of this up, hopefully someone else will eventually examine this question. Finally, I can not help but wonder as to the opinions of *Sceliphron* workers on this subject.

Polistes dominulus Spreading in USA

by
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Greenville, North Carolina 27858-4354)

Miles Guralnick of Vespa Laboratories, Inc. (Spring Mills, PA, USA) sent a nest comb and a short series of *Polistes dominulus* Christ submitted by collector H. T. Hurt of Phoenixville, PA, a town located northwest of Philadelphia. This nest had been collected locally, and a couple others of the same species had been found. The comb is circular with a diameter of ca. 11 cm. and has at least 400 cells, a central main petiole and at least three smaller peripheral petioles. Although no brood remained in the nest (collected 6 September 1990) there was substantial evidence of lepidopteran attack with silk in over half the cells and a couple patches on the upper surface of the comb.

To the best of my knowledge, this adds an additional state to this species' known nearctic distribution as well as serving as the southernmost record in North America. Beside the records for the Boston, MA area and northeastern New Jersey I am aware only of information relayed to me by Chris Starr concerning the occurrence of *P. dominulus* in Tompkins County, NY (NE of Ithaca). Any additional data would be appreciated.

Swarm-Founding Wasp Defensive Behavior (Hymenoptera, Vespidae, Epiponini)

by
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Before I embark on a discussion of the defensive behavior of epiponine wasps, and some speculation on possible directions for further investigation of these behaviors, I would like to thank Drs. Frank Joyce, Robert Jeanne, Laurence Phelps, and Donald Windsor. These seasoned tropical biologists accompanied me in the field in Costa Rica and Panama, shared their knowledge of and enthusiasm for social wasps, and absorbed more than their share of vespid defenses. Though they all helped immensely in locating colonies, collecting wasps, and making observations, the wild speculations that follow are strictly my own. Unless otherwise noted, the observations discussed below were made in and near the town of Gamboa, Republic of Panama, between 10 July and 10 October 1990, while I was a short-term fellow of the Smithsonian Tropical Research Institute. Specimens of the Panamanian wasps were deposited in the S.T.R.I. insect collection at the Tupper building in Panama city.

The defensive behavior I refer to is that evoked by disturbance of active colonies by a vertebrate predator, more specifically a human. This may differ greatly from responses to other vertebrates, and certainly deviates from responses to invertebrate enemies such as army ants, which Ruth Chadab studied with a rigorous comparative approach over ten years ago (Chadab 1979). I will start with a description of epiponine defensive behavior as exhibited by what I consider a mildly to moderately aggressive species, *Polybia occidentalis*. I will follow this with descriptions of defense in species that differ from this pattern in some remarkable way.

I. *P. occidentalis* is a common wasp with colony sizes typically of several hundred workers. Nests are placed fairly low on trees or shrubs, occasionally under palm leaves, and often in open areas. Colony alarm and flying/stinging attacks can be provoked by three means: jarring or shaking the nest or its supporting branch, moving rapidly near the nest, and blowing or breathing on the nest. Workers communicate alarm within the colony by means of a pheromone in the venom (Jeanne 1981). Workers almost never attack humans on approach, and tolerate observations from 10 cm if one moves slowly. Colony aggression, indicated by worker readiness to sting and degree of colony alarm, varies with colony size and colony stage. If brood are present, wasps are more aggressive. Temperature, cloudiness, relative humidity, and other environmental factors may also modify the defensive response. Workers that engage in stinging attacks direct their attention to dark objects, and in most cases fly off after stinging. Workers do not pursue attackers far from the nest, and almost always desist at <10 m distance.

II. Hangers on: wasps of several species employ the disconcerting tactic of clinging to attackers with their mandibles and attempting to sting repeatedly, while buzzing their wings loudly. This behavior potentially combines chemical defense with a powerful auditory signal, the effect of which is enhanced by the fact that workers often grab onto hair on or near the attacker's head, and thus ears. Another common feature is that workers seem unwilling to let go once attached, even if the attacker leaves the nest area. I have destroyed specimens of every "hanging-on" species I have encountered while trying to remove them from my hair or clothing. This behavior has been noted in *Agelaia yepocapa* in Costa Rica (O'Donnell and Jeanne 1990) and *A.* (olim *Stelopolybia*) *areata* in Mexico (Jeanne 1973). Clinging and buzzing were strikingly displayed by *Brachygastra lecheguana* and *Epipona guerini* workers in Panama. All of these species have large colony sizes, typically several thousand workers, and perhaps can afford to lose a few to suicidal attacks. The extent to which this behavior varies with colony size within species is unknown. My suspicion is that vertebrates would easily learn to associate the buzzing sound with the unpleasant stinging attack and later flee on hearing the sound; this idea could be tested through learning trials and by measuring behavioral responses of experienced vertebrate attackers to the buzzing sounds. David Roubik pointed out that diverse stingless bees employ a

similar clinging/buzzing strategy. An analysis of the sounds produced during hymenopteran colony defense might yield insights into similarities across taxa. Another type of persistent attack was employed by large colonies of *Parachartergus fraternus* in Costa Rica in 1989; in this case, workers from two colonies followed and repeatedly stung retreating human invaders over 200 m from the nest.

III. Strong smells: These observations must be interpreted with caution, since human sensitivity to airborne chemicals may be very different from that of more relevant predators of wasps. There may be many additional vespids with scent defense, and conversely the chemicals I describe may not be perceived by other vertebrates. Function cannot be ascribed to these chemicals without experimental testing, which I believe is quite feasible. Jeanne (1973) noted a smell, "somewhat resembling the odor of Ivory soap," when attacked by *Agelaia areata*. Both *E. guerini* and *P. fraternus* workers emitted strong smells during stinging attacks. In high concentrations, these smells or associated chemicals were irritating to human mucous membranes. The smell of *P. fraternus* reminded me of citronella, while that of *E. guerini* was especially strong and unpleasant, reminiscent of rotten celery. It is possible that these volatile compounds are important in intraspecific alarm communication. In addition, vertebrates may rapidly learn to associate these smells with the intense aggression of these wasps; this hypothesis could be tested in similar ways to the ideas on sound mentioned above. It is interesting to note that *P. fraternus* is also capable of squirting its venom through a bee veil and into the eyes of intruders.

IV. Shyness: In marked contrast to the above species are wasps with smaller typical colony sizes. In *Polybia emaciata*, *Protopolybia* (olim *Pseudochartergus*) *fuscatus* (Jeanne 1970), and *Leipomeles* sp. (Bob Jeanne pers. comm.), workers often retreat into the nest, or between the nest and its substrate, rather than attacking. In *P. emaciata*, the initial retreat is usually followed by a dramatic flying/stinging attack if molestation persists. In *Polybia nidulatrix*, a forest understory nesting wasp with very small colonies, workers from two nests rushed out and raised their wings, but seemed reluctant to fly off and sting, even with repeated bumping of the nest. Defense also stops short of stinging in *Parachartergus colobopterus* in Venezuela; after rushing onto the envelope, females fly away from the nest (Strassmann et al. 1990).

As a final note, I think our understanding of the evolution of social wasp defensive behavior would be greatly enhanced by studies of the effects of colony size. In particular, we need to investigate the possibly confounded factors of actual colony population and "species-typical" population size. Are there predictable species-typical differences in defensive behavior, or is colony defense flexible, corresponding to the number of adults or brood present? Observations of epiponine interactions with non-human vertebrates would also be highly informative.

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Behavior of two species of *Larra* in Santa Cruz, Bolivia

by
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Larra bicolor F. and *L. praedatrix* Strand* occur together in varying proportions depending on the locality and season, and parasitize nymphs and adults of *Scapteriscus vicinus*, *S. acletus* and *S.* n. spp. These two species are very similar in appearance and behavior and can only be reliably separated by male genitalia (A.S. Menke, pers. comm. 1991). Therefore some of the observations attributed to one species may refer to the other or both species. In the laboratory, *L. bicolor* parasitizes nymphs and adults of all four species of *Scapteriscus* but prefers large nymphs and adults of *S. vicinus*. *Larra praedatrix* prefers nymphs and adults of the two new species of *Scapteriscus* and of *S. vicinus* and will also parasitize small nymphs of *S. acletus*. Both species of *Larra* will parasitize nymphs of *Neocurtilla hexadactyla*, and *L. bicolor* will, reluctantly, parasitize adults of this mole cricket. However laboratory trials indicate *N. hexadactyla* to be "resistant" to both species of *Larra*, i.e. although eggs are laid, larval development is seldom completed. Only 5 of 328 individuals parasitized at the CIMCA laboratory developed to the pupal stage; 39 additional individuals were stung but no eggs were laid. More than half of the eggs hatched but the parasite larvae died in the first instar; most of the remainder bore no trace of the egg or of larval feeding scars suggesting that the egg had been removed or sloughed off by the mole cricket. In contrast successful parasitism of *Scapteriscus* spp. by *Larra* spp., as measured by development to cocoon formation in the lab, can be as high as 80%.

Light trap records and field collections indicate large seasonal fluctuations and/or activity in populations of *Scapteriscus* spp. and *N. hexadactyla* at CIMCA. When populations of *Scapteriscus* spp. are scarce, females

of *Larra* spp. are forced to seek out *N. hexadactyla* and expend their biotic potential by ovipositing on this unsuitable host. The effect on the *Larra* population would be much more detrimental if emergence from the pupal stage was not so staggered. Our studies in quarantine in Florida indicate that emergence of two *Larra* adults developing from eggs laid on individuals of the same stage and species of *Scapteriscus* on the same day may occur three to four weeks apart. Consequently in Bolivia when populations of *Scapteriscus* reappear both species of *Larra* are able to re-establish and maintain host populations at non-economic levels.

There are occasional reports of mole cricket outbreaks, which damage rice, pastures etc. in the Santa Cruz area. During two of these outbreaks, which occurred on sandy soil a few km west of CIMCA in 1980 and 1987 respectively, adult *N. hexadactyla* were collected at lights. These collections suggest that *N. hexadactyla* was the culprit , but definitive proof (collections of specimens from the soil around the damaged plants) is lacking. Elsewhere *N. hexadactyla* has been the only species collected at light where nearby damage was caused by *Scapteriscus* (J.H. Frank pers. comm. 1991).

*Use of the name *praedatrix* is a presumptive identification by A. S. Menke.

Observations on copulation in Florida and on the behavior of male and female wasps of the genus *Larra* in Santa Cruz, Bolivia

by
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During his studies on the biology of *Larra bicolor* Castner (1983) did not give details on copulation and there is little mention in the literature of courtship or mating. During our investigations, we had not observed copulation with certainty until May 1989, mainly because emergence of adults from laboratory formed cocoons was very staggered and we seldom had newly emerged males and females at the same time. During May 1989 several males and females of *Larra* spp. of Bolivian origin emerged from cocoons held in the DPI, Gainesville, Florida quarantine laboratory over a period of a few days. These were placed in a 8"x8"x16" metal-framed screened cage containing a flowering plant of *Spermococe verticillata* and held in the laboratory in subdued light. In the late afternoon, the cage was placed in full sunlight. This induced rapid flight within the confines of the cage and feeding of several adults at the flowers of *S. verticillata*. Coupling by pairs of *Larra* species was observed on three successive afternoons with four of more couplings being noted on the first day. Coupling is of such short duration that it is almost a non-event! A male in flight lands on a female that is momentarily stationary. If receptive, the female raises the tip of her abdomen and the male engages her copulatory organs for less than five seconds, disengages and then flies off and settles nearby. The female grooms herself passing the posterior tarsi over the tip of her abdomen and the male performs a similar task. Both then resume flight.

Behavioral observations in Bolivia were initiated in 1986 and continued until the end of 1988 with more frequent observations being made from May through October, 1988. The two most abundant species, *Larra bicolor* and *L. praedatrix** are identical in appearance and can only be reliably separated by male genitalia (A.S. Menke pers. comm. 1991). Both sexes of both species of *Larra* visit, in order of preference, *Cissus* sp., *Spermacoce verticillata*, *Euphorbia* spp., and occasionally *Mikania micrantha* and several other unidentified weeds. *Cissus* is visited almost exclusively if it is flowering followed by *S. verticillata* and *Euphorbia heterophylla*. Generally the males appear at flowers as soon as the dew has dried: i.e. from 8:30 to 10:00 am, depending on the time of year, until late afternoon. Females of *Larra* visit flowers from 10:00 am onwards with an activity peak between 12:00 and 3:00 pm.; those of *L. bicolor* visit flowers from about 11:00 onwards with a peak of activity from 12:30 to 3:30. *Cissus* sp., a sprawling vine, occurs in dense mats with many flowers, yet *Larra* males, possibly the same individuals, have been observed to restrict themselves to one or two flower clusters for several successive days. Females of *L. bicolor*, when visiting early in the specified period, arrive swiftly and dart into the foliage where the males seek them out. Apparently large numbers of males frequenting the same site (up to 5 have been observed in a 1 X 10 meter area in 10 minutes) serve to attract a continuous flow of females that are not primarily interested in feeding. Females of *L. bicolor* also lurk in the foliage especially on warm days when it is overcast . However, feeding at nectaries is the principal activity of females, at least those of *L. praedatrix*, for a three hour period, starting from midday, and during this period males insistently pounce on feeding females many of which presumably have already mated.

Castner (1988), on the basis of detailed studies in Puerto Rico and Florida, noted that females of *L. bicolor* foraging at flowers were never approached by males. Our observations in Bolivia suggest that there may be behavioral differences between geographic strains of *L. bicolor*.

Females of *Larra* have been observed patrolling the ground, actively digging after and chasing mole crickets to the surface from 8 or 9 am until midday and again after 4 pm.

Large numbers of adults emerged in early October 1988, a few days after heavy rains ended a 6-month drought. Males were observed flying above hunting females frequently darting after them and attempting to follow them underground. Copulation *per se* has not been observed, however, during this activity where the male lands on the female, albeit briefly, it may have occurred particularly in view of the brief copulation time described above. It seems likely that mating may occur on the ground as well as among the foliage of nectar producing plants. *Cissus* sp. is particularly suitable because of its abundant foliage, and high density of flowers where males aggregate, quite possibly maintaining individual territories, and possibly releasing a sex pheromone. If so, it would be advisable to release males as well as females in areas where establishment of *Larra* is to be attempted This practice would also enhance the probability that females would be mated.

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*Use of the name *praedatrix* is a presumptive identification by A. S. Menke.

ICZN NEWS

Meetings of the International Commission on Zoological Nomenclature*

by
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What will doubtless be recorded as the most momentous meeting in the history of the International Commission on Zoological Nomenclature (ICZN) took place July 4-5, 1990, at the International Congress of Systematic and Evolutionary Biology, held at the University of Maryland, USA. At these sessions the Commission developed a series of fundamental principles to be adopted for the preparation of the forthcoming 4th edition of the **International Code of Zoological Nomenclature** that will revolutionize both the theory and practice of zoological nomenclature. Significantly these principles were first enunciated as the result of an all-day session of the Commission held on America's celebration of the anniversary of the signing of its Declaration of Independence, July 4. Like the statements in that document, these historic changes in the **Code** promise to free systematic biology from the tyranny of the past and provide sound and comprehensive guidance for the future.

Members of the ICZN in attendance at these meetings all contributed to a series of exciting and productive exchanges of ideas that led to overwhelming support for the fundamental and revolutionary revisions in the **Code** described below. They included: O. Kranus (FR Germany, President), H.G. Cogger (Australia, Vice-President), W.J. Bock (USA), J.D. Corliss (USA), D. Heppell (UK), P.T. Lehtinen (Finland), A. Minelli (Italy), C. Nielsen (Denmark), W.D.L. Ride (Australia), J.M. Savage (USA), R. Schuster (Australia), and F.C. Thompson (USA). Clearly the Commission undertook the new initiative for code revision in response to changing needs of the user community and the burgeoning requirements for stable biodiversity data bases. Their goal was to retain the most essential features of previous codes while designing a foundation for the nomenclature of the future.

Underlying all of the Commision actions were three primary principles. First, that as emphasized in the Preamble to the present **Code** (3rd ed.) the overriding purpose of the **Code** is "to promote stability and universality." The Commission agreed that this goal is best achieved by adopting procedures that validate names in current use rather than through following strict priority. Second, as succinctly stated by both Linnaeus and Strictland (the promulgator of the first **Code of Zoological Nomenclature**) that the names given to organisms are simply symbols representing taxa that enhance communication about, allow development of information bases regarding them. Consequently the Commission decided that matters relating to details of othography, transliteration, strict adherence to the rules of Latin grammer, determinations of gender and spelling are secondary to establishing and maintaining a unique, distinctive and stable name for each valid taxon. Third, that the previsions of the **Code** must be simplified and desigined to insure easy and automatic application of them by practicing systematists, with minimum need to petition the Commission for use of its Plenary Powers.

In the following paragraphs I will mention the most important proposals for change adopted during the Commission's deliberations, including a meeting open to all members of the zoological community on July 5. These matters will be presented below in what I perceive to be their order of significance not in the order in which they were considered. It should be noted that the commission reaffirmed through-out these meetings that the Linnean classification system, its hierarchy of taxa and the binomial system of nomenclature are fundamental and irreducible bulwarks of the **Code**.

Without question the most significant and revolutionary changes adopted at these meetings were those that will severely constrain the strict application of priority by giving heaviest weight to the criterion of current usage as the determinant for establishing the validity of names. The first and interim step in this process will be the bringing together of materials in Articles 23c, 79 and 80 of the **Code** making it manditory that senior synonyms that have not been used in the 50 years prior to the date of publication of their rediscovery are to be rejected and are not to be used to upset a long accepted name. No application to the Commissions will be necessary (contrary to the present **Code**) to maintain current usage. Much more important than this improvement, in what might be called the statute of limitations for the resurrection of old names, are a sequence of decisions that the Commission believes will provide a stable and universal zoological nomenclature for the 21st century. The first of these involves the early establishment by the commission of a List of Available Generic Names in Zoology. The list would be developed substantially from Neave's **Nomenclator Zoologicus** and the **Zoological Record** with additions and corrections. At the time of publication (e.g. 1996) the dates in the list (regardless of any subsequent findings) would be the final determinants of priority. In addition and most importantly, only the generic names on this list would be available for use! Any other name, subsequently discovered or not, would not exist for nomenclatural purposes. Obviously new names proposed after 1996 would be available from their date of publication.

A second step in this process will be to ask the appropriate specialist committees (e.g. Nomenclature Committees of the International Congress of various taxonomic groups) to prepare lists of family-group, genus-group and species-group names in current usage. These might be based on up-dated versions of the lists of living mammals and amphibians prepared by the Association for Systematic Collections, for example. After appropriate consideration the Commission would certify such a list as an Official List of Names in Current Use (LNCU). Names not on this list would not be available and would not exist for nomenclatural purposes. Obviously new names proposed for taxa

after the publication of the LNCU would become available from their date of publication. This procedure means that for a particular group there will be no necessity to search for any names published prior to the appearance of the LNCU thus completely freeing the systematist from the past. Essentially each LNCU will be a new (although mini-) **Systema Naturae** and will serve as the new starting point for nomenclature in that particular major group. In poorly known groups it may be sometime before LNCU's will be prepared. For these taxa the revised Article 23c and the List of Available Generic Names in Zoology will provide maximum stability until LNCU's are available.

In another significant area the Commission recognized the inherent incongruity between the absence of knowledge of classical languages by most practicing systematists and the requirements of the **Code**. It was agreed that scientific names are only symbols for taxa in themselves carrying no special meaning and under the current **Code** may even be arbitrary combinations of letters. Consequently, while the Commission believes that names for taxa should continue to be based primarily on words of Latin and Greek derivation, the pertinent articles on name formation in the **Code** will be re-written without reference to the rules of Latin grammar. Specifically a simple and uniform method will be devised for forming family-group names for the future. The accepted spellings of older family-group names will be established by current usage not Latin grammar!

Two other specific issues in the area of grammar were considered. It was agreed that in the case of species-group patronyms that terminate in -ii or -i, either spelling would be admissable regardless of the original spelling (e.g. peters*ii* or peters*i*; boyl*ii* or boyl*i*). Less clearly resolved was the matter of agreement in gender between generic and species-group names based on adjectives. The idea that generic names should be without gender received considerable support, however, there was no agreement on how to establish fixed spellings for the adjective-based species-group names. One alternative might be to make all generic names feminine for purposes of zoological nomenclature. Certainly it would be best if all members of a particular genus had the same adjectival terminations.

The area of what constitutes publication and the criteria of availability were revisited. Clearly with development of new methods of electronic publication and printing unintentional, accidental, personal or even mischievous proposals of new names for taxa are possible. The Commission favored the notion that to be published for purposes of zoological nomenclature a new name must appear in one of a substantial number of approved scientific journals or in books from an extensive list of publishers that were registered with the ICZN. Logistics for such a plan are complex and need further investigation but the aim is to insure publication in the primary scientific literature as opposed to privately printed and/or unedited sources. In the area of availability it is proposed that in order to be available (after a certain date) a new name must be accompanied by an abstract and/or diagnosis purporting to distinguish it from other similar taxa in a language using Latin letter, preferably "a language of the **Code**." A language of the **Code** being any language so designated in the **Code**. Candidate languages are to be determined at a later date.

The Commission agreed that provisions should be added to the **Code** so that in cases where a type genus of a family-group name has been misidentified the first available name for the same taxon is to become the type genus and 2) similarly a misidentified type species of a genus-group name should be replaced by the first available name for the same taxon. Another change would require all future species-group descriptions to include a designation of a holotype, syntypes or hapantotype or in certain cases of ephemeral organisms, an illustration that may be composite (some special designation will be required for these). Such types must be deposited in a museum or similar institution. After a stated date no new species-group name would be available if it does not meet these requirements.

Although the **Code** does not treat names of order-, class- or phyla-groups, the Commission is often thought to have authority in this area. There seems to be some advantage to the community if the ICZN could provide a list of such names in current use, with some indication of preference in usage. Consequently the ICZN will undertake the preparation of a list of recommended names in these categories in zoology. Hopefully this will encourage universality of usage of order-, class- and phyla-group names as key words, in titles and in abstracts.

An editorial committee chaired by F. Christian Thompson is in the process of drafting these dramatic changes into definitive form for action at the meeting of the International Union of Biological Sciences at Amsterdam, the Netherlands, in September 1991. It is important that systematists voice their support of these changes, which are based upon the Commission's response to the demands of both taxonomists and other members of the biodiversity community. Your comments may be directed to the Executive-Secretary, International Commission on Zoological Nomenclature, c/o Museum of Natural History, Cromwell Road, London SW 7 5BD, Great Britain. It is vital to the welfare and future of systematic biology that the progressive and exciting innovations in zoological nomenclature developed by the ICZN at Maryland become implemented. Your individual aid, through endorsement of the major principles described above, in bringing this great enterprise to fruition of biologists and biology generally is an essential ingredient in adoption of a **Code of Zoological Nomenclature** that emphasizes stability based on current usage and is designed for the needs of systematists in the 21st century.

*Reprinted from Insect Collection News, 1990, 4:16-18.

BOOK REVIEWS

Rovarkalauz. László Móczár. 1990. Budapest: Gondolat, Budapest. 260 pp + plates. Price: 240 Forint.

Distributed by: KULTURA Kereskedelmi Vállalat, Budapest I., Fö u. 32 (12), Hungary.

László Móczár continues to produce works of edification for the hard-working entomophilous public. His latest is a lovely little guide to the insects of Europe. Its slightly elongate format, solid, flexible binding and user-friendly organ-

ization show that it is truly designed for field use. Physically, it is in all respects first-rate.

The core of the book is a 120-page section of plates, comprising 350 excellent color photos, 69 of them of hymenoptera. I find the bee pictures especially pleasing. The text is in Hungarian, that mysterious language which gets lumped together with Finnish and Estonian just because nobody has much idea of their affinities. Some might consider this a drawback, but the surrealist sees incomprehensibility as an invitation to the delights of free interpretation.

Still, it is a puzzle to me that this book exists. The number of Hungarian (and surrealist) bug-watchers must be quite small, and it is hard to believe that such a production is economically feasible. Yet the price is less than a day's pay for a skilled worker in Hungary. With (expensive) postage, the total cost to foreigners should still be less than US$10.

Anyone desiring a copy should contact either the distributor (address above) or the author (H-114 Budapest, Szabolcska Mihály u. I. III/I, Hungary). Contacting the author will probably be quicker and less trouble.

The stamp collectors among you will have noticed that Hungary issues an unusually large number of insect stamps and or greater originality than those of many other countries. I suspect that László Móczár may have something to do with this.

Chris Starr
Taichung, Taiwan

Natural history of social wasps and bees in equatorial Sumatra. Shôichi F. Sakagami, Ryoh-ichi Ohgushi and David W. Roubik (edit.), 1990. Hokkaido University Press, Sapporo, Japan. 312 p. Order from: Maruzen Co., Ltd., Export Dept., P.O. Box 5050, Tokyo International 100-31, Japan. Sea mail, $148 in U.S. currency (air mail, $176).

This book contains 14 chapters, most of which are studies of various vespid and bee taxa, but it also includes a chapter on a lady bird beetle, and one on a bug. The chapters are written by a variety of specialists. Subject matter of interest to readers of **Sphecos** includes a key to the Sumatran species of Vespinae and Polistinae, a review of stenogastrine nest architecture, behavior of several stenogastrine species, and the biology of three species of *Vespa*.

Ancient extermination

SAY WHAT?

A Request for Clarification Concerning the Scientific Note by Grissell et al., 1990, An Observation in which the Unknown Prey (really just a Gummy Brown Mass) of an Unknown Species of *Polistes* (possibly *exclamans* Viereck (Hymenoptera: Vespidae), A.S. Menke, personal communication) was Robbed when it was Knocked to the Ground by an Unknown Species of *Vespula* (possibly *squamosa* (Drury), (but Who Really Knows) (Hymenoptera: Vespidae), E.E. Grissell, personal communication) during an In-Flight Battle that Lasted Approximately Twenty Seconds (EDST) in the Vicinity of Colesville, Montgomery County, Maryland on 11 August 1990 at about 11:30 a.m. on a Relatively Warm, Windless Day. Sphecos 20:35

by

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Are twenty seconds of Eastern Daylight Savings Time different from twenty seconds anywhere else in the universe? Or have I misinterpreted the intended meaning of the abbreviation (EDST) in your publication? Please explain.

A response to "A request for Clarification ...etc., etc. *ad inf.*" posed by Byron A. Alexander

by

E. Eric Grissell

Well, Byron, you do pose a most interesting question. And my answer is an unequivocal "maybe" based upon the relative time-frames (RTE) involved. You see, as I write this I am in the Eastern Daylight Savings Time Zone (EDSTZ), but when you read it you will most likely be in the Central Region Analagous Zone out-Yonder (CRAZY), or perhaps not, depending, of course, on where you are (which, itself, is a relative question that only you can answer and then maybe not very well at that). It is a well-established fact (WEF) (Nonymous, 1974) that not all time is created equal. Some time is more valuable than other time and it thusly follows (TF) that if time can differ in value then it must have different values and it then TF that the only values time has are related to time and being related to time must be considered relatives. As has been demonstrated in the Well-Known Theory (WNT) (Known and Well 1986a, 1986b, Well and Known 1986) different values of time (DVT) are (or am) the result of relative time (RT) and it TF that time is relative. The following equation makes this clear:

$$20 \pm 5 = \frac{RTF \times \frac{WEF}{TF}\left[\frac{TF \times TF \times TF}{WNT}\right] - 1 \times EDSTZ}{1 + CRAZY + TF^{3}\left[\frac{\Delta DUT \text{ x (or am)}}{RT \times TF}\right]}$$

Now to directly answer your question so that even you can understand it, we must factor in the degree of relative time (DRT) based upon the observations of Ruth and Brothers (1989) who proved that any 2 people in different places at different times could not likely be the same person in the same place at the same time (this is also called the Schizoid Theory (ST) or the Theory of Many Facies (TMF) -- take your pick). Thus, relative time depends upon where we are. For example if I am EDST and you are CRAZY then it becomes only too clear what the problem is. We know that we are 2 people in different places so it must follow on the basis of the R & B hypothesis that we are in different times.

Now, taking the first part of the puzzle, i.e., that time is relative, and then putting the second part of the puzzle

with it, i.e., we are in different times, we are left with one inescapable conclusion: the puzzle has 2 parts. I think this pretty much answers your question, doesn't it? It amply demonstrates that 20 seconds of EDST is different than 20 seconds of CRAZY. It only remains to be seen "How much different?" And that is a question for another time because it is not relative to this discussion.

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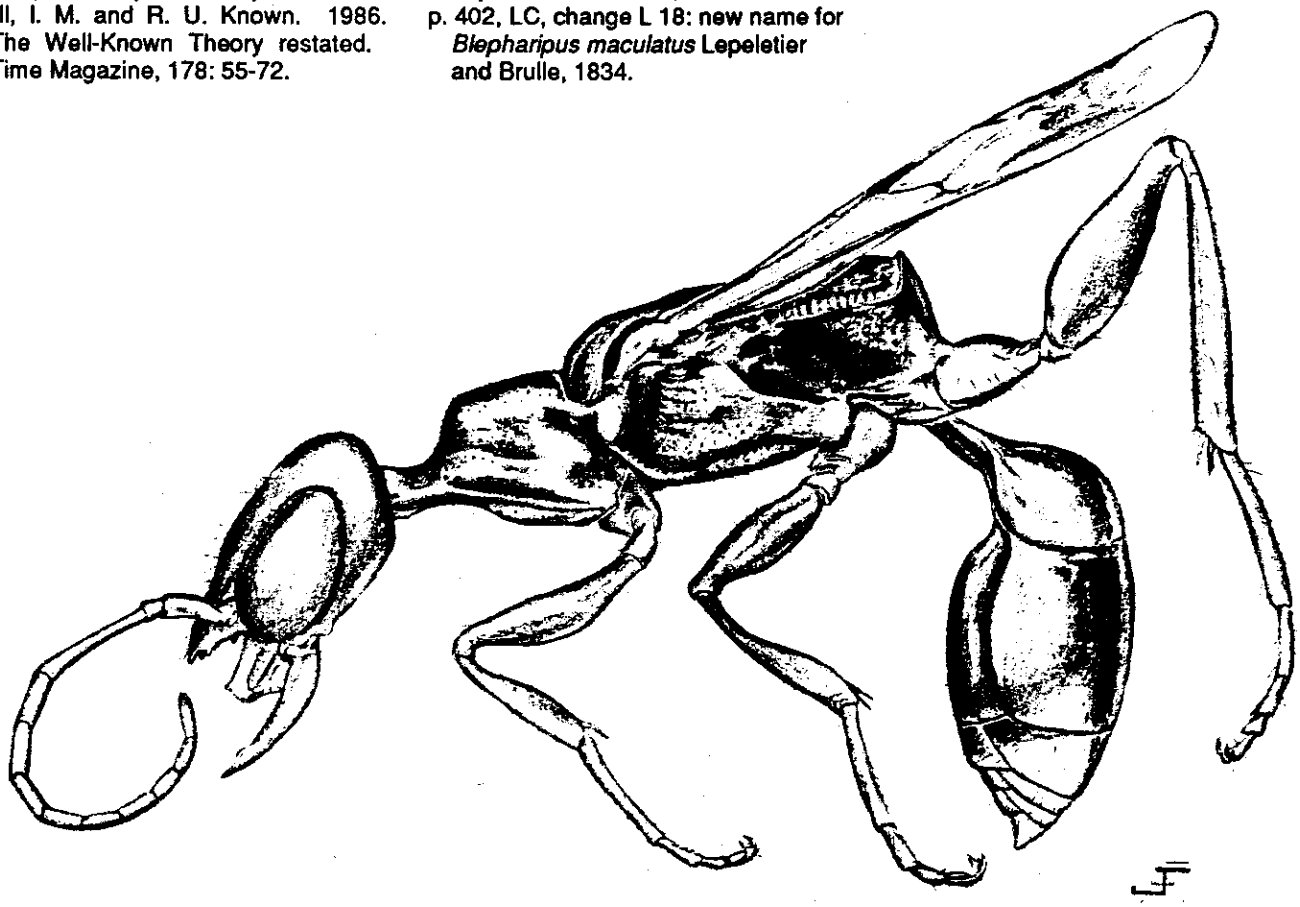
BIG BLUE BOOK ERRATA Part 16

p. 115, LC, insert after L 10 as species: *gilberti* Turner, 1908; Australia.
p. 390, LC, L12: *rolotum* is correct.
p. 390, LC, L10 from bottom: *zelandum* is correct.
p. 400, RC, L1: Thomson is correct.
p. 400, RC, L10 from bottom: add (*Crabro*) after Dalla Torre.
p. 400, RC, L 27: 1958 is correct, not 1956.
p. 401, LC, L 38: add after (*Crabro*): nec Vander Linden, 1829.
p. 401, LC, L 43: 1959 is correct, not 1964.
p. 401, RC, L 9: 1970 is correct, not 1960.
p. 401, RC, L 27: 1945 is correct, not 1944.
p. 401, RC, L 15 from bottom: 1959 is correct, not 1964.
p. 402, LC, insert as species after L 8: *lippensi* Leclercq, 1958; Zaire.
p. 402, LC, insert at end of L 14: new name for *Blepharipus maculatus* Lepeletier and Brulle, 1834.
p. 402, LC, change L 18: new name for *Blepharipus maculatus* Lepeletier and Brulle, 1834.
p. 402, LC, L 18 from bottom: *leucostoma* is correct.
p. 402, RC, insert as synonym after L 11: *daisetsuzanus* Tsuneki, 1947 (*Crabro*).
p. 403, RC, L 11-12: *sugiharai* is correct. Transfer as synonym of *pauxillus*.
p. 403, RC, insert as species after L 19: *takeuchii* Tsuneki, 1957; Korea.
p. 403, RC, insert as synonym after L 12 from bottom: *bojus* Schrank, 1802 (*Crabro*).

Change 1879 to 1880 for the following names in *Philanthus*:
californicus & *sublimus* Cresson (synonyms of *crabroniformis*, p.564)
scelestus Cresson (synonym of *bilunatus* on p. 564)
pacificus Cresson on p. 566
scutellaris Cresson (synonym of *sanbornii* on p. 566)
zebratus Cresson (p. 567)
basilaris Cresson (as synonym of *zebratus* Cresson on p. 567, but now recognized as species by Ferguson, 1984)



Ampulex canaliculata Say

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RAINFORESTS

A GUIDE TO RESEARCH AND TOURIST FACILITIES AT SELECTED TROPICAL FOREST SITES IN CENTRAL AND SOUTH AMERICA

By James L. Castner

With Foreward by Dr. Peter Raven

Tropical rainforests are being destroyed at the rate of approximately 100 acres per minute. Each day more of the irreplaceable flora and fauna that lives within these complex ecosystems disappears forever. Global concern for rainforests has prompted government support of tropical forest conservation and encouraged biologists to conduct research in those rainforests remaining. Yet to date, there have been no references available evaluating and describing specifiic sites and facilities for those interested in conducting research, or for those merely visiting rainforests to enjoy their beauty and biologicl diversity. The book **Rainforests: A Guide To Research and Tourist Facilities at Selected Tropical Forest Sites in Central and South America** attempts to fill that empty 'literay inche'.

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- I have seen this book and I highly recommend it for anyone doing research in the Neotropical region - edit.

2nd Quadrennial Meeting

International Society of Hymenopterists

August 11-17, 1991

Halifax Hall
Univeristy of Sheffield
Sheffield, England

SCIENTIFIC PROGRAM

(begins Monday morning, August 12)

Keynote Speaker: Ian Gauld, Natural History Museum, London
"The Role of Taxonomic Studies of Hymenoptera in Costa Rica Conservation Biology"

Symposium: **Phylogeny of Hymenoptera**
Organizers - Andy Austin, University of Adelaide, Australia
- Denis Brothers, University of Natal, South Africa

The above symposium will include several invited speakers and is aimed at the family level or above. Any submitted papers on this or related topics phylogeny of Hymenoptera will be scheduled as part of this symposium.

Symposium: **Biodiversity of Hymenoptera**
Organizer: John LaSalle, Natural History Museum, London

Several speakers will be invited to present talks in this symposium. If you are planning to submit a paper for either symposium, you should contact the organizers.

Complete program will be mailed to registrants in June, 1991.

Schedule for the week (tentative):

Aug. 11 Sunday	Arrival, registration 1-9 pm.
Aug. 12 Monday	Registration, opening, keynote address,papers, social.
Aug. 13 Tuesday	Papers.
Aug. 14 Wednesday	Business meeting, posters, papers, banquet.
Aug. 15 Thursday	Papers.
Aug. 16 Friday	Papers.
Aug. 17 Saturday	Tour of Chatsworth House.
Aug. 18 Sunday	Departure.

Daily schedule (tentative):

7:00 - 8:45 am	Breakfast
9:00 - 10:30 am	Meetings
10:30 - 11:00 am	Break
11:00 - 1:00 pm	Meetings
1:00 - 2:00 pm	Lunch
2:00 - 4:00 pm	Meetings
4:00 - 4:30 pm	Break
4:30 - 6:30 pm	Meetings
7:00 pm	Dinner

Evenings free

For information concerning registration and accommodations contact:

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Sheffield, England S10 2TN
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For information about submitting papers contact:

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