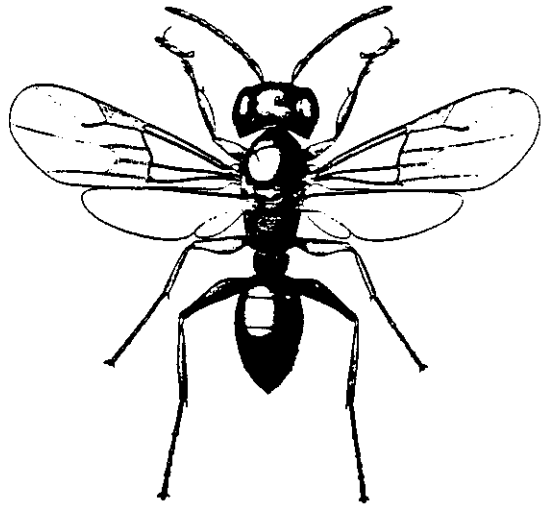
SPHECOS

A FORUM FOR ACULEATE WASP RESEARCHERS



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Editorial Chaff

Sphecos is gaining in stature. The 1987 Zoological Record abstracted some articles from Sphecos 13! Does this mean Sphecos is a publication? I suppose that only time will decide that, although Dave Wahl (Ichnews 10:1-2) says that "these newsletters don't count as 'real' pubs." But then the opinion of anyone who is still using the word "erected" (Ichnews 10:4) in connection with genera is suspect (see Sphecos 10:25). If my comments sound like I want Sphecos to be recognized as a "publication" - well it isn't true. I don't really care one way or the other. Mike Sharkey and Dave Wahl are to be congratulated, by the way, for their fine presentation on the "Phylogeny of the Ichneumonidae" in Ichnews 10.

Larry Bezark has agreed to help produce a new Sphecos Directory and as soon as Ron McGinley comes through with a copy of the software program used for the Melissa Directory we can get going on this much needed item.

Our wasp logo for this issue is Anteon flavicorne (Dahlman). I want to thank Terry Nuhn for again entering much of this issue into the computer.

Research News

Howard Evans and Kevin O'Neill (Colorado State University, Fort Collins, Colo. 80523) report that their monograph on the natural history and behavior of North American beewolves (Philanthus) is scheduled to be published in 1988 by Cornell University Press.

Arnold Menke's revision of the New World species of Pison is essentially finished with only the illustrations to be completed. Forty four species are recognized, 29 of which are new. Next on Arnold's research program is a revision of the New World species of the mole cricket predator genus Larra. He would like to borrow specimens of this primarily neotropical genus for his revisionary work. If you or your museum has material please contact Arnold.

Raimond V. Hensen (Rijksmuseum van Natuurlijke Historie, Postbus 9517, 2300 RA Leiden) reports "I am presently studying Old World Liris, and intend to revise at least the Malagasy species. My future plans include futher studies on Oriental and Afrotropical Liris, and a cladistic treatment of the genera of the Larrini. This all on condition that I can get the work financed (I am unemployed at the moment), and won't have to accept a job as a computer programmer somewhere. My revision of Chalybion s. s. has been accepted by the Tijdschrift voor Entomologie, and my review of Oriental and Australian Isodontia is fairly advanced. A paper on Malagasy Belonogaster, with L. Blommers will appear soon."

Colin R. Vardy (Dept. of Entomology, British Museum (Natural History), Cromwell Road, London SW7 5BD, England), who is revising Pepsis, advises us, "The main rules which have been applied by previous authors in describing new species of Pepsis are as follows:

1. If a species has two sexes, they must of course be described as two species.
2. Every slight colour variation needs a different species name.
3. Any species of which one has not seen the type must be described as new.
4. Any two specimens whose localities are geographically far apart must automatically represent two species, irrespective of how similar they are.
5. Most important of all, never identify any specimen from a description if you can describe it as new.

"You can imagine how many synonyms this has produced - the record stands at about 7 names for one species so far. The estimate of real species numbers in the genus has risen from 200 to 250 recently, because of the discovery that there are complexes of sibling species in the festiva-group. Because the species of each complex sometimes share strong colour patterns and are distinguished only by small structural characters, they have all tended to be 'lumped' together until now."

Charlotte T. Samuel (P.O. Box 255, 70730 Seremban, Malaysia) completed her PhD on "Factors affecting colony size in the stenogastrine wasp Liostenogaster flavolineata" this past July, under Michael H. Hansell. [Comment by Chris Starr: Despite its rather modest title, Charlotte's thesis is an important milestone in the social biology of wasps. It is the first really large study of any stenogastrine and should thus do much the same for that subfamily as Mary Jane West-Eberhard's and Bob Jeanne's doctoral theses did for the Polistinae.]

Dr. Ulrich Maschwitz (Zoologisches Institut, Siesmayerstr. 70, D-6000 Frankfurt am Main, West Germany) reports that his current projects include the biology of Provespa and comparative alarm communication in Vespidae.

Li Qiang (PO Box 85-3, Graduate School, Beijing Agricultural Univ., Beijing China) writes: "My present work is on the classification of chinese Sphecinae (Sphecidae). I have identified some specimens belonging to the genus Sceliphron Klug. Five species and subspecies, Sceliphron deforme atripes (Morawitz), S. d. deforme (Smith), S. madraspatanum kohli Sickmann, S. javanum chinense van Breugel and S. destillatorium (Illiger) have been recognized. Further, I want to work on other genera of Sphecinae, but I lack literature." Qiang is now working on Ammophila in China - editor.

Chris Starr (Dept. of Entomology, National Museum of Natural History, NHB-165, Washington, D.C. 20560) tells us: "My main undertakings at present are an analytical-synthetic treatment of nest structure in the stenogastrine wasps and revision of the genus Parischnogaster. Each of the these is proceeding well, and I expect to have completed Parischnogaster by mid-1988. After that, Seiki Yamane and I will likely get seriously to work on revising Eustenogaster. On the other hand, my intended study of the historical biogeography of the stenogastrines is looking less and less practical (the historical geology of Southeast Asia is in such a confused state, and we have only the vaguest idea of how old the stenogastrines are), and I have put it on the shelf for now.

"I spent the month of October 1987 fruitfully in the Netherlands and Britain, working mainly at the Rijksmuseum in Leiden and the British Museum in London. Outside of the museums, my consultations with Jack van der Vecht and Mike Hansell were extremely valuable. Jack has graciously loaned me his taxonomic notebooks on Parischnogaster, Eustenogaster and Liostenogaster, which are even more helpful than I had expected. In Europe I also had the pleasure of meeting other aculeatists in person for the first time, including Mick Day, George Else, Colin Vardy, Paul Williams, and the young hotshot Raimond Hensen."

Allen Hook (Dept. of Zoology, Univ. of Texas, Austin, Texas 78712) has been surveying the wasps of Brackenridge Field Laboratory on the Colorado River in Texas. He says that 20 species of Cerceris have been taken, as well as 22 species of mutillids. Allen has biological data on a species of Chlorion there that provisions with cockroaches! He adds that the BFL is "going down the tubes due to the presence of Solenopsis invicta."

Coralia Sanchez Alonso (Instituto de Ecologia y Sistematica Academia Ciencias de Cuba, La Habana 2, Cuba) writes: "I am very interested in the Sphecidae. Little work has been done on them in my country. My husband and I have made many observations on Cuban species. We completed a study on the nesting aggregation of digger wasps which took a year of observations. In a group of 15 species, we found niche differentiation in several areas (spatial, temporal, and taxa of prey). We found guilds of prey size, generalists and specialists, and observed their autoecology. The species observed were Astata unicolor, Tachysphex antillarum, Liris fuliginosa, L. spp.(2), Sphex jamaicencis, Prionyx thomae, Hoplisoides ater, Bicyrtes spinosa, Stictia signata, Bembix americana antilleana, Cerceris cerverae, C. zonata, Oxybelus analis and Philanthus banabacoa."

R. M. Bohart (Dept. of Entomology, Univ. of California, Davis, Calif. 95616) is working on Pterocheilus and Euparagia now that he and Lynn Kimsey have finished their book on Chrysididae.

Rogerio Parentoni (Dep. Zoologia, C.P. 6109, Unicamp., 13083 Campinas, S.P. Brazil) says: "My interest is in the ecology of digger wasp communities. The species in the community I am studying appear to need direct sunlight (temperature) and bare ground for their nesting activities. I plan to compare these species in different localities to see how well this assumption predicts their habitat. In five months I have observed 30 species of Pompilidae and Sphecidae, including Nyssoninae, Sphecinae, Philanthinae and Larrinae. In the Nyssoninae I'm preparing a manuscript about the reproductive behavior in Editha magnifica. The males are territorial and the females catch butterflies of Lycaenidae, Hesperidae, Nymphalidae, Pieridae and Papilionidae. The skippers are the most frequent item in the diet of E. magnifica. Another paper I'm writing now is about the comparative behavior of two Tachypompilus species that belong to the same community."

Arturo Roig (Dept. of Entomology, Univ. of Kansas, Lawrence, KS 66044) writes: "In January 1988, thanks to a Smithsonian short term visitor grant, I spent two weeks studying the pompilid collection at the Smithsonian Institution, sitting at the S. A. Rohwer desk. Besides the study of types and the general collection, unidentified material was sorted to genus to make it available for future studies. I paid special attention to the Neotropical material. There are some good series from Chile and Venezuela (Menke and Carpenter, col.). I borrowed the specimens of Calopompilus, a revision of which I am planning to begin soon."

Cengizhan Özbay (Fac. of Art and Sciences, Univ. Dicle, Diyarbakir, Turkey) reports that he is working on the "Systematics and Distribution of Vespidae."

Peter Kunz (Abt. Entomologie, Landessammlungen für Naturkunde, d 75 Karlsruhe 1, Postfach 3949, West Germany) is working on the chrysidids of Baden-Württemberg (SW-Germany) as a student of Prof. K. Schmidt.

Eduardas Budrys (Inst. Zoology and Parasitology, Lithuanian Acad. Sci., MTP-1 Vilnius 232600, USSR) reported in December: "Now my revision of Diodontus has nearly stopped for the next 2 to 3 months - finishing a candidate thesis ("Pemphredoninae of the USSR fauna") takes all of my time. However, descriptions of 9 new species and illustrations to 33 palearctic species have already been made, and many types have been examined."

Christian Schmid-Egger (U. Kirschbäumlebuck 18, D-7840 Müllheim, West Germany) and Heinrich Wolf ((Uhlandstr. 15, D-5970 Plettenberg, West Germany) are working on the fauna and ecology of the Pompilidae of Baden-Württemberg, in the southwest of Germany.

Help Needed

Arturo Roig (Dept. of Entomology, Univ. of Kansas, Lawrence, KS 66044) requests unidentified material of Calopompilus Ashmead (= Nearctic "Chirodamus"); especially from Mexico and Central America, but also would welcome U.S. material.

Chris Starr (Dept. of Entomology, National Museum of Natural History, NHB-165, Washington, D.C. 20560) writes "The genus Metischnogaster (Vespidae: Stenogastrinae) comprises two described species from Malaya and the Malay Archipelago. In the collection of the University of Copenhagen I

have recently found from northern Thailand two males of a rather stupendous new Metischnogaster which is evidently the sister-group of the other two. Despite extensive search and inquiry, I have failed to locate any females or nests, or even any more males. If any of you has collected stenogastrines north of the Isthmus of Kra, especially in mid-mountain forest, please contact me."

Arnold Menke (Dept. of Entomology, National Museum of Natural History, NHB-165, Washington, D.C. 20560) is soliciting loans of any New World material of the sphecid genus Larra for a revision.

Dr. Max Fischer (2. Zoologie (Insecten), Naturhistorisches Museum Wien, A-1014 Vienna, Austria) has assembled the following list of publications of Mr. Karl Hammer (1871-1958) who was active in Mutillidae after 1945. He would like to know about any other publications by Karl Hammer.

1930. Über Mutilliden mit besonderer Berücksichtigung der in der Wiener Umgebung bisher aufgefundenen Arten. Ent. Anz., 10:61-87.
1934. Schwedisch-chinesische wissenschaftliche Expedition nach den nordwestlichen Provinzen Chinas. Hymenoptera. Scoliiden, Mutilliden, Chrysididen. Arkiv för Zoologi, 27A:1-3.
1948. Über einige von Kjell Kolthoff und anderen in China gesammelten Hymenoptera. Chrysididae, Cleptidae, Mutillidae. Arkiv för Zoologi, 42:1-12.
1950. On the insect fauna of Cyprus. Results of the expidition of 1939 by Harald, Håkan and P. H. Lindberg. Hymenoptera aculeata II, Scoliidae und Mutillidae der insel Cypern. Soc. Scient. Fennica Comm. Biol., 10:1-17.
1955. Contributions a l'etude de la faune entomologique de Ruanda-Urundi. LXXVI. Hymenoptera Mutillidae. Ann. Mus. Congo Tervuren, in 8^{0}, Zool. 40:297-403.
1957. Beiträge zur Kenntnis der Insectenfauna Ostafrikas, insbesondere des Matengo-Hochlandes. Ann. Nat. Hist. Mus. Wien, 61:232-237.
1962. Mutilliden (Insecta: Hymenoptera) aus dem Indischen Museum in Calcutta. Rec. Indian Museum, 58:1-51.

William H. Clark (Museum of Natural History, College of Idaho, Caldwell, Idaho 83605) sent in the following request:

Information on ants, especially Pogonomyrmex wanted

Paul Blom and I are currently working on a bibliography of the genus Pogonomyrmex (Hymenoptera: Formicidae). We would appreciate receiving any publications or references of publications concerning these ants (especially in Latin America). We are interested in any publication which mentions the genus Pogonomyrmex - it could be a journal article, book, thesis, dissertation, magazine article, etc. We would also be interested in receiving any specimens of ants (especially of Pogonomyrmex) that you could send (either pinned or in alcohol), as long as they are determined and have complete collection data with them. Be sure and package them to survive international mail.

Address Changes

Eduardas Budrys: Institute of Zoology and Parasitology, Lithuanian Academy of Sciences, MTP-1 Vilnius 232600, USSR.

Peter van Ooijan: Voorstraat 5b, 3512 AH Utrecht, Netherlands.

Nikolaus Mohr: Altenberger Domstr. 44, D 5050 Bergisch Gladbach 2, West Germany.

Frank "Paco" D. Parker: ARS, USDA, Apartado Postal 10053, 1.000 San José, Costa Rica.

Lynn Kimsey: Dept. of Entomology, Museum of Comparative Zoology, Harvard Univ., Cambridge, Mass. 02138.

Missing Person

Does anyone know the current address of Dr. Charles Calmbacher.

Forum

An apology to Alex Rasnitsyn is in order. The title of his Forum article in Sphecos 14, page 23, was misprinted!! His title should have read:

THE IMPORTANCE OF NOT BEING A CLADIST

Hopefully this did not cause too many readers to scratch their heads - editor.

RASNITSYN ON CLADISTICS

by
Jim Carpenter
(Museum of Comparative Zoology, Harvard University, Cambridge, Mass.)

Rasnitsyn's contribution (Sphecos 14:23-25) is notable primarily for the tired repetition of arguments refuted long ago. Aside from equivocation as to whether phylogenetic systematics and cladism are two different things (about which, see Hennig), he makes two points. The first is the assertion (still widely repeated) that cladistic classifications reflect only geneology, whereas amount of divergence is also part of "phylogeny" and is better represented by a phenetic arrangement. Since these parts of "phylogeny" conflict, some compromise is required, and, of course, "evolutionary" or "syncretist" classification is the desired compromise (which is really just tradition). None of the premises of this position are true. Cladistic classifications represent something besides branching patterns - anyone should immediately realize that they represent information on certain characters (synapomorphies) very well indeed. As for amount of divergence, cladistic classifications better represent phenetic information than phenetic classifications. The cophenetic correlation coefficient (the phenetic measure of goodness of fit of phenogram to the original similarity matrix) is better optimized by cladograms. Finally, a compromise is not required. Cladistic classifications better represent information on all characters - not just synapomorphies - than competing arrangements. All of this is established in the papers of J. S. Farris, as discussed by me in Sphecos 13. None of his arguments have been effectively countered. Critics of cladistics had better acquaint themselves with these arguments, otherwise they will continue to delude themselves by arguing from false premises. The full citations for the most pertinent papers follow:

Farris, J. S. 1977. On the phenetic approach to vertebrate classification. In Hecht, M. K., P. C. Goody and B. M. Hecht (eds.), Major patterns in vertebrate evolution. NATO Adv. Stud. Inst. Ser. 14. Plenum Press, New York: 823-850.

Farris, J. S. 1979. The information content of the phylogenetic system. Syst. Zool. 28:483-519.

Farris, J. S. 1980. The efficient diagnoses of the phylogenetic system. Syst. Zool. 29:386-401.

Farris, J. S. 1982. Simplicity and informativeness in systematics and phylogeny. Syst. Zool. 31:413-444.

Farris, J. S. 1983. The logical basis of phylogenetic analysis. In Platnick, N. I. and V. A. Funk (eds.). Advances in Cladistics 2. Columbia Univ. Press, New York: 7-36.

Rasnitsyn's second point concerns the desirability of taxa which are part of a "monophyletic continuum." This is nothing more than the concept of "convex groups" espoused by advocates of clique analysis such as Estabrook (e.g., 1986, Syst. Zool. 35:560-570). Both monophyletic and paraphyletic taxa are permitted by this concept. Therefore the resulting classifications are necessarily less informative than strictly cladistic classifications: the paraphyletic groups are not defined by characters, but only by absences, and contribute nothing to the process of character information storage/retrieval. Further, convex classifications may thus give "inconsistent (and misleading) information on character evolution" (Wiley, 1981, Syst. Bot. 6:346-358, who should be read for a detailed critique of the convex concept).

The fact that cladistic classifications are better at the representation of overall similarity than systems designed to reflect it should not really be surprising. As Hennig and Brundin pointed out in 1966, a system reflecting phylogeny (=geneology, Rasnitsyn to the contrary) best represents information on all evolutionary phenomena, because all such phenomena relate to the time

dimension of genealogy. Classifications based on overall similarity (always ambiguously defined of measured) are no more than special purpose systems. The phylogenetic system, being more predictive, stable and having a higher information content, is clearly a better choice for a general reference system.

MORE ON NATURAL

by
Jim Carpenter

Snelling (Sphecos 14:29-30) still does not completely grasp the Mill/Gilmour concept of "natural." In response to Wahl, he states "The presumed natural hierarchy is determined by the investigator...and therefore he claims his classification to be 'natural'....One cannot prove, even though he may claim, that his proposed arrangement does, in fact, 'mirror the natural hierarchy'." If by "natural hierarchy" you mean nature's hierarchy, this is true enough. But this is not an exact synonym of the old concept. As discussed in Sphecos 13, under this concept a system is natural to the extent that it conveys information on characters. And that of course can be measured for any particular feature or set thereof, using Farris' diagnostic procedure. In the competing vespine classifications of Archer and Carpenter that Roy mentioned, mine is more natural - it accounts for both character sets more efficiently (see Sphecos 11:7). The diagnostic count for Archer's classification for the characters I mentioned is 22, whereas for my classification it is 11. As I pointed out in Sphecos 13:13, of the parts of the systems in dispute, Archer's was based on 8 characters while mine was based on 9, so my classification would better diagnose his data than the converse. This type of natural system is expected to be nature's hierarchy, but without Revealed Truth, this cannot be proven, but so what? To paraphrase Hennig, as *if* in science we could anywhere recognize Truth and were not instead limited to erecting hypotheses about it. Hypotheses explaining more data are generally considered superior to those explaining less.

A PHILOSOPHY ON MUSEUM COLLECTIONS

by
R. M. Bohart
(Dept. of Entomology, Univ. of California, Davis, Calif. 95616)

In my opinion the various elements of a collection can be broken down into categories of more or less importance. (1) Collecting the specimens is important. (2) Curating material (pinning, labeling, sorting) is more important. (3) Identification by an expert is most important. It can be argued that it is like asking which came first or which is most important, the chicken or the egg? I don't agree at all. We have all seen huge lots of material collected by light trap or Malaise trap and put into alcohol for future use which never seems to materialize. The labor, often quite considerable, of curation has to be done, but in itself means little unless it leads to identification by an expert. After this last event the specimens can be used in ecological, distributional, and revisional (taxonomic) studies leading to publication. I have personally done a great deal in all 3 elements of the collection mentioned above. The collecting was probably the most enjoyable, curation the most tedious, identification the hardest and most time-consuming, but in the final analysis the most rewarding.

"POLYBIINI"? - WHERE IS IT FROM, AND WHERE IS IT GOING?

by
Jun-ichi Kojima
(Dept. of Biology, Ibaraki University, Mito 310, Japan)
and
Jim Carpenter
(Museum of Comparative Zoology, Harvard University, Cambridge, MA 02138, USA)

The term "Polybiini" was used by Richards (1962) for a group comprising all polistine genera aside from Polistes and Sulcopolistes (= "Polistini") and Ropalidia (= "Ropalidiini"). Since then, "Polybiini" has usually enjoyed tribal status. However, since 1980 this has changed. Now, some authors do not divide Polistinae into tribes, a few use "Polybiini" in a different sense from Richards, and others still follow Richards' view.

Our opinion is clear - we do not wish to accept apparently unnatural taxa, and we do not feel it desirable to discuss the evolution of behavior with unnecessary formal taxa. In order to show that the term "Polybiini" is unnecessary, or even misleading, we will summarize how "Polybiini" has been used.

Richards (1962, A Revisional Study of the Masarid Wasps): Primarily following the system of Bequaert (1918), he divided the Polistinae into three tribes: Polistini, consisting of the cosmopolitan genus Polistes and the social-parasitic genus Sulcopolistes; Ropalidiini, comprising the Old World genus Ropalidia only; and Polybiini, with 23 New World genera and 3 Old World genera. He did not clearly state the basis of the division, but judging from his discussion on structures of taxonomic importance, the only character separating Polybiini from Polistini and Ropalidiini is the shape of the propodial orifice (abbreviated PO hereafter). He said "In the Vespidae it is often rounded but acutely angular in Polistes and Ropalidia" (p. 19). No other character defining Polybiini was given or discussed.

Charnley (1973, Bull. Buffalo Soc. Nat. Sci., 26): Comparing the states of PO among many species of the Vespidae (in the sense of Carpenter, 1981), he concluded that the shape of the PO was so variable in the "Polybiini" that the character could not be used as a distinguishing feature.

Richards (1978, The Social Wasps of the Americas): He disputed Charnley's conclusion, stating that the PO shape "enables the Polistini and the Polybiini to be separated more easily than one would suppose from Charnley's remarks about intermediates" (p. 2). He retained his 1962 classification of the Polistinae, that is, they were divided into three tribes. On the other hand, he stated that PO was "sometimes narrow dorsally but usually quite wide with a rounded top" (p. 7) in Ropalidiini, "relatively long, narrowed and often pointed above" (p. 8) in Polistini, and "nearly always rounded at top and though often considerably longer than broad, much shorter than in Polistes" (p. 8) in Polybiini. Regarding Ropalidia, his statement is quite different from that made in 1962. Thus his definition of the polistine tribes became more vague - wasps which have a narrow PO and subsessile metasoma are Polistini, those with the second tergum and sternum fused are Ropalidiini, and the remainder are Polybiini. Ironically Richards himself showed that Polybiini is a "catch-all" taxon.

Jeanne (1980, Ann. Rev. Entomol., 25): On behavioral grounds, he suggested that the four strictly Old World genera of Polistinae (Ropalidia, Parapolybia, Belonogaster, Polybioides) form a natural group. They show peritrophic sac extracting behavior, which is absent in all the remaining species of Polistinae.

Carpenter (1981: Syst. Ent., 7): From a cladistic analysis of the Vespidae, he concluded that Polybiini is defined by a symplesiomorphy and so is a paraphyletic group.

As shown above, no one (even Richards) seems to regard Polybiini as a natural group defined by any useful diagnostic characters, let alone certain synapomorphies. Under such circumstances, why don't you throw the polistine tribes away as rubbish? We look forward to seeing comments on this note from Sphecos readers, regardless whether he or she loves "Polybiini" of dislikes it.

Our scanning of recent papers reveals that several to many hymenopterists still insist on the three-tribal division of Polistinae. Isn't it high time that the apparently non-monophyletic taxon is thrown away?

Treatment of "Polybiini" by West-Eberhard is interesting - her "Polybiini" includes Ropalidia (1982: in Social Insects of the Tropics, Vol. 2). Thus her "Polybiini" is monophyletic (Carpenter, unpublished analysis). However, since most hymenopterists are more familiar with Richards' three-tribal division than Mary Jane's two-tribal division, it may take several seconds (or days?) to notice that her "Polybiini" is different from Richards'. Is "Polistes; Polistine genera other than Polistes" clearer than "Polistes; Polybiini in the sense of West-Eberhard"? Is "Polistes; Strictly Old World Polistinae; New World Polistinae" clearer than "Polistes; Old World Polybiini in the sense of West-Eberhard; New World Polybiini in the sense of West-Eberhard"? Let's try to avoid using formal names that make us confused, anyhow!

DEVELOPMENT OF A THEORY OF THE ORIGIN OF BEES: A CONTRIBUTION TO THE METHODOLOGY OF PHYLOGENETIC STUDIES

by
Url Lanahm
(Univ. of Colorado Museum, Campus Box 218, Boulder, CO 80309)

Late 1930s or thereabouts: Hugo Rodeck of the University of Colorado Museum told me of visiting Robert E. Snodgrass, at the U. S. National Museum to test his reputed ability to tell a bee

(in this instance a Nomada, an extremely wasp-like parasitic bee) from a sphecid wasp by looking inside the thorax. In a few minutes, with a small blade and a couple of pins RES had taken apart the thorax and found the structure which, among all the aculeates, is unique to bees (Smithsonian Misc. Coll. 103 (1942) No. 2, p. 63). More on this later.

Mid-1950s: While compiling a key to sphecid wasps I note a structure that looks promising as a new diagnostic character, then back track and find it in all sphecid wasps: structures on the hind legs [termed a "pectin" in Bohart & Menke 1976:27] similar in function and morphology (although not so obvious, hence overlooked) to the cleaning strigils on the front legs of all Aculeate Hymenoptera.

1960: I find this information in the German literature and bring it to the attention of American readers in a note in Ent. News 71:85-86, where C. Börner 1919 is cited as dividing aculeates into two sections: Haplocnemata (ants, bees and scolioid wasps) without cleaning strigils on the hind legs, but with the usual pair on the front: and the Diplocnemata (sphecid, pompilid, and vespid wasps), with two pairs.

1960-70: If the haplocnemates are a natural group, then ants as well as bees (long known to invariably have branched hairs) should sometimes have them, as atavastic characters of no adaptive significance. In a sense, their discovery in ants would confirm a predication made from the Börner theory. During ten years of more or less desultory searching, while no compound hairs were found in the diplocnemates (a "prediction come come true"), to my continuing disbelief, neither were any found in ants. Until--

Ruth Bernstein, who studies ant ecology at the University of Colorado tells me, ca 1970 that she has seen a couplet in Creighton's key to the species of ants of North America wherein one is given the choice of hairs compound or hairs simple. Right! But Acanthomyops plumipilosis seems to be the only native North American ant with compound hairs.

When I complain to Howard Evans about the scarcity of compound hairs in ants he exclaims: "You say they are rare in ants? Ants got compound hairs all over the place!" and took from the bookshelf a handfull of monographs by G. C. and J. Wheeler on larval ants, which turn out to be forested by modified single-cell hairs of dozens of different kinds, which require a special terminology, and include any number of species with compound hairs like those of bees. This fact is put into a theory on the origin of bees in a paper by me in the J. New York Ent. Soc. 87:91-94. The adaptive significance of these hairs, according to the Wheelers is that they make possible social nesting in cavities without individual cells for each larva. According to evolutionary theory, the transfer of immature characters to adults (neoteny) is a routine matter, if the results have adaptive significance, in this instance hairs that help harvest pollen. In 1981 I publish a paper (JNYES) giving a phylogenetic tree of the aculeates according to the doctrine of Börner, somewhat modified.

The consequences of the Börner theory suggest that the first bees were social, nesting in cavities. This brings up the RES observation on the
internal thoractic structure of bees. His axillary lever facilitates the flexing action of the wings which flips them back over the abdomen. This can be demonstrated in a freshly dissected bee with a light touch of a needle on the tip of the lever. Bernd Heinrich in his book on bumble bee economics says that the bees are able to heat the hive because the large indirect flight muscles, uncoupled from the wings, can vibrate to produce heat rather than a combination of heat and kinetic energy as in flight. He attributes this ability to the action of the third axillary sclerite, apparently overlooking the axillary lever which is on the fourth sclerite. I have found the axillary lever in between ten and twenty genera of bees, and it is represented in the same position by a solidly affixed spine in other aculeates, as recounted by Snodgrass and as I have observed myself. RES says that the axillary lever is a starting device which pulls the third axilla into a new position. The axillary lever is presumed to have been retained in the solitary bees that evolved from their social ancestors as a method of warming up the flight engine and to get the wings out of the way while exploring inside flowers.

Most antlike of the bees are the minute and social meliponids, the genera Melipona and Trigona, with omnivorous diets. Most have elongate tongues in the style of Apis, but this character has been much overrated as an advanced structure, in recent years having been found in a number of primitive genera, and some Trigona have short, normal mouthparts. Most also have a corbicula on the hind basitarsi as a pollen carrying structure, sometimes used to carry mud as well, and some species are without the corbiculum. The venation is also much reduced, probably related to their small size, but again some variability is found. Small colonies of rare species should be sought in search of evidence of relationship to ants or other haplocnemates. The only bee larvae

to have compound hairs, as in ants, are in the allodapine bees of the Old World, related to melipones and to Apis, which nest communally in cavities in wood without individual cells.

One of the most interesting and little known of the hoplocnemates are the thynnid wasps. In Australia male thynnids are the most common of the flying aculeates (not counting ant swarms), and there are hundreds of species. The female is wingless, and many burrow through rotting logs to lay their eggs on beetle larvae. Thynnids are almost unique among the aculeates in that the winged male assumes some role other than fertilization. With a pair of claspers at the end of the abdomen, he carries the female to flowers, where he places her in a position such that she can drink nectar. With fuel replenished, she is carried back to her hunting site. It may be that among them are cavity nesters which would shed light on a bee-wasp-ant relationship. It is already generally accepted that thynnids are near the ancestry of ants.

But Evans tells me that he thinks "The ancestors of bees are extinct." When looking at a couple of boxes with representative genera of bees and sphecid wasps he noncommitally remarked, "They don't look much alike, do they."

Pet Peeve Dept

COMMENTS ON SIBLING GROUPS
(Sphecos 14:33)

Ray Gagné (Systematic Entomology Lab., National Museum of Natural History, Washington DC 20560) has this to say: "The word 'Gruppe' in German is feminine, so the modifier must comply. Thus Henning used 'Schwester-gruppe', a phrase directly translated to 'sister group' in English. In French the word 'gruppe' is masculine, so writers in that language use 'brother group' (as groupe-frère).

Necrology

Dr. Gilbert E. J. Nixon died in August 1987 at the age of 82.

Obituaries

SIMONE KELNER-PILLAULT
(1925-1985)
by
J. Casevitz-Weulersse
(Entomologie, Muséum National d'Histoire Naturelle,
45, rue de Buffon, F-75005 Paris, France)

Il y a un peu plus del deux ans déjà (le 28 septembre 1985) que le Docteur Simone Kelner-Pillault, Maître de Conférence au Muséum National d'Histoire Naturelle, à Paris, responsable du service Hyménoptères, disparaissait brutalement, victime d'une chute accidentelle à la veille de son départ à la retraite.

Née le 18 juillet 1925, elle professa dans l'enseignement technique en 1941, puis dans l'enseignement secondaire tout en poursuivant des études universitaires à partir de 1950. En 1956 elle commence, sous la direction du Professeur P. P. Grasse, une thèse "Etude écologique du peuplement entomologique des terreaux d'arbres creux (Chataîgners et Saules)" qu'elle soutient en 1967.

Entrée au Muséum en 1957, elle est chargée de la gestion d'un ensemble considérable de collections (Hyménoptères mais aussi nombreux autres "petits ordres"). Entretien, rangement et communication de matériel s'ajoutent à son travail de terrain.

En 1962 elle participe à la création d'un enseignement de Biologie et Biosystématique des Insectes à la Faculté des Sciences de Paris où, pendant plus de 20 ans, elle contribuera à la formation de nombreux entomologistes avec une énergie inlassable. En 1971 elle crée un enseignement technique sur les Insectes, au laboratoire d'Entomologie, où elle acueillera de nombreux élèves (débutants, jeunes amateurs, techniciens de divers laboratoires). En 1982 elle participe à la création d'un enseignement du Muséum sur les Animaux venimeux et en assurera la partie entomologique jusqu'à la veille de sa mort.

Dès son entrée au Muséum, Simone se consacra à l'étude d'Hyménoptères parasites (Proctotrupoides, Cynipoides et Bethyloides), puis aux Aculéates. Elle se pencha particulièrement sur l'étude des Abeilles fossiles de l'ambre balte.

Elle participa activement à la célébration du 150 anniversaire de la naissance de J. H. Fabre, et présenta une remarquable conférence sur l'oeuvre scientifique de l'Ermite de Sérignan.

Mais surtout, pour la communauté internationale des Hyménoptèristes, elle était irremplaçable par ses connaissances, son expérience et son dévouement. Dans des conditions difficiles, seule à gérer des collections historiques considérables, elle ne refusa jamais son aide, consacrant une grande partie de son temps à retrouver les types demandés par ses correspondants, leur proposant du matérial trié à étudier, fournissant de la documentation bibliographique et des listes documentées des collections, contribuant ainsi à la réussite de nombreux travaux taxonomiques dans le monde entier. Son absence nous est cruelle, nous nous efforçons de suivre son exemple et d'assurer le mieux possible la continuité de la gestion des collections d'Hyménoptères du Muséum National.

HYPPOLYTE JANVIER
(1892 - 1986)

by
J. Casevitz-Weulersse
(Entomologie, Muséum National d'Histoire naturelle,
45, rue de Buffon, F-75005 Paris, France)

Le Docteur H. Janvier s'est éteint, à l'âge de 94 ans, le 14 septembre 1986, à Oléron où il résidait depuis de nombreuses années. Son fils, selon sa volonté, a fait don de sa collection, de divers manuscrits et de sa bibliothèque entomologique au Laboratoire d'Entomologie du Muséum. Cet ensemble, qui comporte principalement des Hyménoptères Aculéates paléarctiques et un grande nombre de nids et autres documents biologiques, demandera un gros travail de rangement avant que l'on puisse en estimer la réelle importance. On y trouve rassemblés un nombre considérable de représentants de divers groupes d'Hyménoptères.

Une partie de sa carrièr se déroula au Chili, puis il rentra en Europe où il travailla essentiellement à l'European Parasite Laboratory, Entomology Research Division.

Naturaliste à l'esprit ouvert et curieux de tout le monde vivant, il s'intéressa à la Botanique, aux Insectes et autres Arthropodes, à l'Ethnologie. Il correspondait avec le Muséum National d'Histoire Naturelle à Paris, le Musée de l'Homme, la Smithsonian Institution, l'Indian Museum de New York, le Musée de Santiago etc. Il obtint, en 1928 le prix Hirn de l'Académie des Sciences.

Il publia de nombreux travaux portant sur des sujets extrêmement variés : flore et faune du Chili, biologie de divers groupes d'invertébrés, comportement, entomologie appliquée, étude des forêts vierges de l'Araucanie, moeurs et coutumes des Indiens Aracans, etc.

Hyppolyte Janvier avait, entre autres activités, étudié le comportement de divers Hyménoptères, dont les Sphégiens.

Nous citons quelques unes de ses plus importantes publications dans ce domaine :

"Los Odineros de Chile" (1924, Ann. Univers. Chile, 100 p.)

"Los Esfexos de Chile" (1926, idem, 70 p.)

"Recherches sur les Mellifères du Chili" (1926, Anls. Sc. Nat. Paris, 155 p.)

"Recherches biologiques sur les Prédateurs du Chili" (1928, idem, 140 p.)

"Etudes biologiques de quelques insectes du Chili" (1931, idem, 148 p.)

Trois de ses derniers ouvrages sont hélas difficilement accessibles car édités par lui-même en polycopie : "Comportement des Crabroniens" (1977) : 552 pages. "Comportement d'Abeilles Colletidae" (1979) : 350 pages, et "Larves d'Hyménoptères Nidifiants solitaires" (1979) : 320 pages.

L'oeuvre écrite de ce chercheur infatiguable est considérable et gagne certainement à être mieux connue.

Les Hyménoptères qu'il a récoltés, depuis son retour en France, forment un ensemble important d'insectes représentatifs de la faune du sud ouest de la France avec quelques récoltes en Espagne et en Afrique du nord. Ils sont maintenant à Paris, où, nous l'espérons, des spécialistes des divers groupes viendront les étudier.

CARL F.W. MUESEBECK
(1894-1987)

(News Release. November 18. 1987. from the
Office of Public Affairs. Smithsonian Institution. Washington. D.C. 20560)

Carl F.W. Muesebeck. a U.S. Department of Agriculture research entomologist and research associate at the Smithsonian Institution who was a pioneer in the the practical application of biological control of insect pests. died of congestive heart failure Nov. 13 in Schenectady. N.Y. He was 93.

Mr. Muesebeck. born in Medina. N.Y.. graduated in 1916 from Cornell University with a bachelor of science degree in entomology. After graduate studies at Cornell in entomology and botany. he joined the USDA Bureau of Entomology. serving as a scientific assistant in biological studies before returning to Cornell in 1918 as an instructor in entomology.

In 1921. he again joined the USDA Bureau of Entomology and for the next 10 years conducted research and directed the work of other employees on the biology and taxonomy of parasitic wasps. which were introduced into the United States for the control of gypsy. brown-tail and satin moths.

For 2 1/2 years. beginning in 1926. he traveled extensively throughout central Europe. while based in Budapest. Hungary. directing USDA studies there on the biology of European parasites useful in the control of the gypsy moth and other forest pests. He also collected. reared and shipped these useful species to the United States. where they were successfully introduced for pest control.

From 1935-1954. Mr. Muesebeck was in charge of the USDA Division of Insect Identification in Washington. D.C. One of the foremost authorities on Hymenoptera,...Mr. Muesebeck was the author of more than 100 major scientific papers. In 1951. the USDA awarded its Distinguished Service Award to him.

Mr. Muesebeck was a member of the Entomological Society of America (president. 1946). Entomological Society of Washington (president. 1940. and honorary president. 1971-1987). Biological Society of Washington. Society of Systematic Zoologists. Washington Academy of Sciences and Sigma Xi. He belonged to the Cosmos Club from 1936 to 1954.

Following his retirement from government service in 1954. he continued his entomological research work until 1980 as an honorary collaborator and research associate at the Smithsonian Institution's National Museum of Natural History. A resident of Hyattsville. Md.. during his years with the USDA and the Museum of Natural History. he moved to Schenectady in 1982. There are no immediate survivors.

[Carl F.W. Muesebeck was buried at Elba. N.Y. - Editor]

An Enigma

The botanist Julian Steyermark reported the following botanical adventure in the Chicago Natural History Museum Bulletin. July - August issue. 1945. The story took place in the coastal cordillera of Monagas. Venezuela. Does anyone know what kind of wasp he may have observed?

"I can also report that I am the first botanist to have climbed two other high peaks in that region. namely. Cerro Negro and Cerro Peonia or Pajaritos. The latter had a phenomenon on its summit which may be unique in the records of Venezuelan entomology. I refer to the billions of semi-dormant hibernating wasps covering the trees on the summit of Cerro Peonia or Pajaritos.

"When I first reached the summit. I saw large dark brown masses of color in large portions of the tree trunks. branches. and among the leaves. At first they resembled some of the epiphytic mosses or hepaticae one often sees in cloud forests. but on closer inspection I was amazed to find that they were masses of wasps huddled together with their brown wings folded and touching each other; their bodies were prostrate over the trunk or branches.

"There were a large number of trees of which I wished to secure specimens. but the men were afraid to fell them because every blow of the ax resulted in a rain of wasps by the thousands. Many trees had to be ignored because the entire trunk was covered with the wasps.

"The ones we did cut were selected ones which had fewer (hundreds instead of thousands or millions) wasps than the others. but even these were dangerous. because at every stroke of

the ax down came wasps by the handfuls. We got stung many times. There was a dried up sphagnum bog on this summit and I got stung trying to grab specimens of terrestrial moss or sedges and other herbs, because the wasps were also in the moss on the ground and among moss-covered branches. Everywhere one walked on the summit among the bushes and suffruticose Hypericum and melastoms he would encounter wasps, because they would be in dangling masses suspended between the leaves. You cannot imagine a rarer experience to befall a collector of plants. It is the most unusual one I have ever had."

Scientific Notes

A MINUTE SPHECID WASP COLLECTED IN JAMAICA

by
Anthony Raw
(Laboratorio de Ecologia, Univ. de Brasilia,
Brasilia DF, Brazil)

At Irish Town in Jamaica I was excavating nests of the anthophorid bee Paratetrapedia swainsonae on a day early in May 1972 (Raw 1984, Revista Brasileira de Entomologia 28:497-506). The bees nested in a vertical bank of sandy loam about a hundred metres from the post office and twenty metres along the track that leads to Strawberry Hill.

While I was working a tiny insect flew in front of me and, instead of alighting on the bank, it disappeared. I looked carefully, but there was no sign of a hole. Three or four minutes later the same thing happened again so I felt it must be a nesting aculeate. I waited two minutes presuming the insect would leave and then, at the spot where it had disappeared, I touched the bank lightly. Less than a minute later the insect was back and alighted on the bank at the same spot and I caught it in a vial.

It was a sphecid and the prey she carried was an immature thrips. It was barely 1 mm long! I tried to excavate the nest, but could find no tunnel and no cell. I wonder if it was some kind of pemphredonini such as Spilomena?

The specimen was deposited at the British Museum. Mick Day looked for it recently, but didn't find it. It might even be among their Parasitica. It might prove simpler to look for more specimens at Irish Town. Sphecid specialists visiting Brian Freeman's field station should keep their eyes open for it.

POLISTES DOMINULUS CHRIST IN NEW JERSEY

by
Robert S. Jacobson
(Dept. of Pathology, School of Medicine, East Carolina Univ.,
Greenville, North Carolina 27858-4354)

While in New Jersey a few weeks ago, I saw about a dozen females of Polistes dominulus Christ (= gallicus of authors) flying about and landing on cultivated flowers of Impatiens sp. The wasps walked along the stems and buds (sap secretions, or had aphids been present to release honeydew?) but didn't appear to seek nectar from the flowers themselves. No males were seen, and neither of the two native species of Polistes in the area (fuscatus and exclamans) were on the plants. A couple workers of Pyrobombus impatiens were foraging from the flowers. (Union, Union Co., New Jersey, afternoon of 30 August 1987.)

MORE ON CUTICULAR HYDROCARBON TAXONOMY

by
Kenneth G. Ross
(Dept. of Entomology, University of Georgia, Athens, Georgia 30602)

After reading Robin Edwards' description of a paper on cuticular hydrocarbon taxonomy of honey bees in Sphecos 14:33, I thought readers might be interested in hearing of a paper I recently co-authored with R. Vander Meer, D. Fletcher, and E. Vargo, "Biochemical phenotypic and genetic studies of two introduced fire ants and their hybrid (Hymenoptera: Formicidae)".

Evolution 41:280-293. In this paper we used genetic markers from enzyme electrophoresis to verify that gas chromatographic profiles of micromolecular characters, in this case hydrocarbons and venom alkaloids, can serve as sensitive indicators of genetic differentiation, and thus potentially have some use as taxonomic tools in a diversity of insect groups. Indeed, concordance between the genetic and GC markers in distinguishing between introgressed and parental colonies of fire ants was very high, suggesting that CG phenotypes for these characters in these ants are highly heritable. This is significant because the heritability of these compounds is basically unstudied. Our results suggest that the techniques are sensitive enough to be used to study differentiation at the species level and below, at least in this group of ants.

This relatively new approach may be of interest to those systematists working with "problem" groups that have been difficult to study using traditional characters. A major goal now should be to define the genetic bases of these GC characters and to develop useful algorithms for inferring phylogenies from these characters.

Collections

THE LITTLE KNOWN KARL V. ROSER COLLECTION OF HYMENOPTERA

by
Till Osten
(Staatliche Museum für Naturkunde,
Rosenstein 1, D-7000 Stuttgart 1, West Germany)

I would like to bring to your attention an old, extensive collection of Hymenoptera. Even in Germany this collection is almost unknown. I talk about a part of the insect collection of Karl v. Roser (1787-1861). Karl v. Roser studied natural history in Tübingen and Paris (Cuvier) and later became director of the ministry of foreign affirs of Württemberg. Therefore he had the interest and the opportunities to collect insects all over the world. In addition, other collectors sent material to him. This big collection was donated by his heirs to the "Verein für vaterländische Naturkunde, Stuttgart" and constituted the base of the insect collection of the "Staatliches Museum für Naturkunde, Stuttgart" of this day. The former curator of Entomology in Stuttgart, Prof. Dr. Ernst Hofmann (1837-1892), put this collection in order and expanded it. While parts of the collection (Coleoptera, Lepidoptera, Diptera, etc.) that were not destroyed by wars or dermestids have been integrated in our main collection, I decided to keep this singular collection of Hymenoptera as a unit. In new boxes, the collection contains 80 boxes of "Symphyta" and Apocrita (Parasitica) and 90 boxes of Aculeata. All families of wasps from all over the world are represented. Besides a large collection from the south of Germany, where v. Roser lived, there is also quite a lot of material from South Africa for example, collected by Baron Carl v. Ludwig (1784-1847) and Ferdinand v. Krauss (1812-1890). The data on the labels are not very exact by todays standards. Here follows a list of the most frequent labels of the Aculeata in the v. Roser collection:

de Saussure	1880	Am. mer.	Dr. Arnold	1874	Java
"	1880	Am. bor.	Dr. Schweinf.	1878	Gazellenfluß (Africa)
"	1879	W. Ind.	Dr. Warth	1878	N. Punjab
"	1880	Chile	v. Barth	1855	Borneo
"	1884	Roma	Beutenmüller	1884	Paraguay
"	1874	Mexico	Spieth	1887	Sklavenküste
"	1889	Sidney	Mohr	1880	Akem (W. Afrika)
A. Krauß	1878	Canton	Fink	1859	Sidney
v. Krauss	Natal	1888	v. Schwabinsky	1877	Odessa
v. Müller	1888	Victoria Australien	A. Appl	1877	Libanon
Sarg	1881	Guatemala	C. Faber	1878	China
Dr. Scholl	1856	Java			

The year cited above might be the year when our museum obtained the specimen. Many of the wasps are not yet determined to species. I am sure that many wasp workers will find interesting things in this material. If interested in more details, please write to me. I will give any help I can.

SPHECOS 16:14 - 1988

DUCKE TYPES OF WASPS IN THE NATURHISTORISCHES MUSEUM IN BERN

by
Arturo Roig
(Dept. of Entomology, Univ. of Kansas, Lawrence, KS 66044)

Types of the 270 or so species of Neotropical Hymenoptera described by Adolph Ducke are distributed in several museums and it is not always easy to find them. Ducke's material can be found in Belem (for a list of the types in the Museu Goeldi, see Nascimento, 1979), Sao Paulo, Paris, Berlin and Bern among other places. A quick look at modern revisionary work shows that authors have overlooked the Bern collection as a depository of types. The accompanying list was obtained thanks to the kindness of Dr. H. D. Volkart. Bees are not included, but such information can be found in Melissa. Species marked "T" are represented by specimens with Ducke's handwritten labels and the indication "type". Species marked with an asterisk are represented by specimens not labeled as a type but can be proven to belong to the syntype series. Complete bibliographic information on each name listed here can be found in Nascimento and Overal (1979). For further information contact: Dr. H. D. Volkart, Naturhistorisches Museum Bern, Bernastrasse 15, CH-3005 Bern, Switzerland.

CHRYSIDIDAE
Amisega aeneiceps, female, male, T
Amisega mocsaryi *
Amisega mocsaryi var. cyaniceps *
Chrysis crotonis, female, male, T
Chrysis ellampoides, female, T
Chrysis friseana *
Chrysis glabriceps *
Chrysis goeldii, female, male, T
Chrysis guedesii, female, T
Chrysis lecontei, female, male, T
Chrysis leucocheiloides, female, T
Chrysis longiventris, female, T
Chrysis obidensis, male T
Chrysis paraensis, male T
Chrysogona alfkeni *
Chrysogona silvestrii *
Cleptes mutilloides *
Ellampus huberi *
Ellampus paraensis, female, T

SPHECIDAE
Anacrabro meridionalis, female, T
Aulacophilus eumenoides *
Bothynostethus aberrans, male, T
Bothynostethus clypearis *
Bothynostethus collaris *
Bothynostethus dubius *
Dolichurus obidensis, female, male, T
Dolichurus obidensis maranhensis, female, T
Nitela amazonica, female, male, T
Nysson alfkeni, female, T
Nysson divergens, female, male, T
Solierella amazonica, male, T
Solierella antennata, female, male, T

EUMENIDAE
Eumenes alfkeni *
Monobia atrorubra, female, male, T
Zethus buyssoni, female, male, T
Zethus corallinus, female, T
Zethus inermis, female, male, T
Zethus spiniventris, male, T

VESPIDAE
Chartergus nitidus, female, T
Chartergus pusillus, female, T
Chartergus rufiventris *
Megacanthopus alfkenii, female, T
Megacanthopus collaris, female, T
Megacanthopus goeldii, female, T
Megacanthopus lecointei, female, male, T
Megacanthopus punctatus *
Monacanthocnemis buyssoni, female, T
Nectarina buyssoni, female, T
Parachartergus amazonensis, female, T
Parachartergus difficilis *
Polistes claripennis, female, T
Polistes deuteroleucus, female, T
Polistes erythrogaster, male, T
Polistes goeldii, male, T
Polistes occipitalis, female, T
Polistes synoecoides, female, T
Polybia decorata, female, T
Polybia holoxantha, female, T
Polybia huberi, female, T
Polybia incerta, female, T
Polybia micans, female var. *
Polybia minarum, female, T
Polybia myrmecophila *
Polybia ruficornis, female, T
Polybia rufitarsis *
Polybia velutina, female, T
Polybia vulgaris, female, male, T
Protopolybia punctulata, female, T
Protopolybia rugulosa, female, T
Synoecoidea depressa *

Nascimento, P. R. T. 1979. Catálogo de tipos entomológicos do Museu Goeldi. Hymenoptera. Bol. Mus. Paraense Emilio Goeldi, Nova Serie, 98:1-18.

Nascimento, P. R. T. and W. L. Overal. 1979. Contribuições entomológicas de Adolpho Ducke: Taxonomia e bibliografia. Bol. Mus. Paraense Emilio Goeldi, Nova Serie, 95:1-17.

GMELIN MATERIAL IN THE NATIONAL MUSEUM OF IRELAND

In a recent letter to Lynn Kimsey, James P. O'Conner of the Natural History Museum, Dublin, Ireland outlined the fate of the Gmelin material supposedly in his collection. Gmelin insects were contained in the Leskean Collection that was purchased in the early 1800's by the Royal Dublin Society. That society established the Natural History Museum in 1857 and what was left of the Leskean Collection now resides there. O'Conner says, however, that all of the Hymenoptera of Gmelin are "destroyed or thrown out!"

HYMENOPTERA IN AMERICAN ENTOMOLOGICAL INSTITUTE

The Hymenoptera holdings at the AEI (3005 SW 56th Avenue, Gainesville, Florida 32608) were counted at the end of 1987. The total specimens for each of the aculeate wasp families were as follows:

Bethylidae	11,083	Psammocharidae	25,116
Chrysididae	2,894	Rhopalosomatidae	368
Clystopsenellidae	24	Sapygidae	234
Dryinidae	6,226	Sierolomorphidae	151
Embolemidae	435	Sphecidae	18,631
Mutillidae	6,386	Scoliidae	1,093
Plumariidae	195	Tiphiidae	10,329
Vespidae	6,693		

These specimens are of worldwide origin, with relatively few from Eurasia. Loans for taxonomic revisions are made to persons who are qualified and have a good reputation for returning specimens. Henry Townes.

Techniques

STRENGTHENING FRAGILE PAPER NESTS FOR PERMANENT PRESERVATION

by
Chris Starr
(Dept. of Entomology, National Museum of Natural History, NHB-165,
Washington, D.C. 20560)

In looking over stenogastrine wasps in various museums and private collections, I've been dissatisfied about two things. First of all, specimens (females, males, larvae, the nest) from the same colony are rarely identified as such. The resulting loss of information is serious but preventable (Sphecos 8:22-25), and I hope more collectors will make it a habit to prevent it.

Second, collections of stenogastrine nests are surprisingly sparse. It is well known that they are diverse and taxonomically valuable, so that I would very much like to see it become a habit to collect them along with the wasps. It would also be useful if larger series of conspecific nests were collected, as the analysis of variation within and between populations is definitely worthwhile in many species.

It is evidently their extreme fragility which deters people from trying to bring back stenogastrine nests, but this is easily solved. Here is a simple and effective way to strengthen nests made largely or entirely of fragile carton. This technique is a slight improvement by K. S. Nagaraja and myself on one originally described by H. T. Pagden (Malayan Nat. J. 12:148, 1958).

Make a varnish by dissolving a pingpong (= table tennis) ball in acetone. About one-half a ball cut up into 20 or 25 ml of acetone is good for a start. Using an old water-color brush, apply the varnish to all external surfaces of the nest. When the varnish dries, the nest will be

quite noticeably stronger. It will also be slightly darker, but except for the study of fine structure the value of the specimen should be in no way diminished.

It is important that the concentration of the varnish be right. In particular, if it is too thick it will not properly impregnate the walls and will stay on the surface as an unsightly white film. Pagden's rule is that the varnish should be just thin enough to flow off the end of the brush. The acetone will tend to evaporate as the vial is repeatedly opened for use, so be prepared to add acetone from time to time.

Varnishing is also an effective way to fortify nests of independent-founding polistines, such as Polistes and Mischocyttarus, though these usually do not to need it to serve as permanent specimens. Much the same can be said of small cartonized ant nests (e.g. many Crematogaster and Polyrhachis, some dolichoderines), and it works well in those few cases when a part of a vespine or swarm-founding polistine nest needs strengthening.

One final comment. It seems generally best to avoid wrapping nests in cotton. Mike Hansell and I find that the strands get tangled in the nest material and are a nuisance to remove. If padding is needed, I suggest tissue paper.

Translation of Jacobson, 1935

Edward Jacobson's "Aanteekeningen over Stenogastrinae" of 1935 was an important early contribution to stenogastrine biology and is often cited. As far as I know, it has not previously been translated into any major language of science, so that many such citations are probably from secondary sources. In addition, the paper is in a rather obscure journal. My English translation below is provided in order to make Jacobson's observations more directly accessible. I have modernized the paper's format somewhat and explicitly cited some papers where Jacobson simply implied them.

The results are not of equal significance. Most important are the observation of Parischnogaster spp. foraging on leftover prey fragments in spider webs and observations on the semi-translucent white substance. As far as is now known, the conjecture that all stenogastrines forage on spider webs is correct. The argument that the white substance (now called abdominal substance) is of glandular origin has been confirmed, but Stefano Turrillazzi has conclusively shown that it is not in fact a larval food. Jacobson's casual implication that the rings above and below the cells, which are now known to be chemical ant-guards of P. nigricans, are of the same substance as the putative larval food was long overlooked and almost certainly correct. On the other hand, his experiments on homing orientation in P. mellyi contribute nothing of evident value and can safely be ignored. The three criticisms given at the end of the paper are all correct, but only one is of lasting significance. Saussure was indeed mistaken to infer that the combs of P. mellyi are connected by petioles, and it now seems certain that no stenogastrine constructs a petiole.

A few remarks on the author are in order here. These are mostly taken from an obituary by J.C.H. de Meijere and personal communications from Kees van Achterberg. Edward Jacobson (1870 - 1944) was a Dutch businessman who moved to the Dutch East Indies (now Indonesia) in 1897. As an ardent naturalist he collected and observed extensively on Java and Sumatra and associated small islands. In 1908 he may have been the first to collect aculeates on Krakatau, just 25 years after the eruption. He sent specimens especially to the Rijksmuseum in Leiden and the University of Amsterdam. Jacobson was not fond of business, and at about 40 years of age he retired to devote himself fully to natural history. He was apparently wealthy enough to do so without constraint. In World War II he was captured by the Japanese and died as a prisoner of war.

Meijere included a partial bibliography of 54 papers by Jacobson in four languages, mostly insects. A complete bibliography would be hard to compile. The Dutch East Indies were a company colony, largely independent of the state and with their own rather isolated scientific organizations. There are very likely other papers of his lying in obscure colonial journals.

Christopher K. Starr

SPHECOS 16:17 - 1988

Notes on stenogastrine wasps (Hymenoptera: Vespidae)[1]

by
Edward Jacobson

The subfamily Stenogastrinae is divided into just two genera[2], Stenogaster Guérin (= Ischnogaster Guérin) and Parischnogaster Schulthess, which was earlier included in the old genus Stenogaster (Schulthess 1927). Although the group is fairly large and the wasps easy to observe, little is known of their natural history. We have good figures of the nests of a number of species in each genus, but for the majority even this is lacking. Most of the known biological details have been reported by Williams (1919, 1928).

Although I collected a large series of natural history observations on several stenogastrine species in Java quite some time ago, through an unfortunate set of circumstances these remained unpublished and were later lost, while the specimens on which they partly depended were also lost. I had no better luck with material which I later assembled in Sumatra; this was sent to an American specialist for analysis, but it was not worked up, nor did I receive it back. Unfortunately, I am no longer in a position to collect new material. Nonetheless, I would like at least to call up some recollections on the subject, in hopes that these will stimulate younger entomologists to undertake fresh investigations. To my great regret, my notes from 1900-1912 are no longer in my posession, so that I must rely entirely on memory for my facts. These observations primarily relate to Parischnogaster mellyi and nigricans; I am uncertain exactly which other species were also studied.

An interesting fact which came to my attention in 1908 in Batavia[3] concerns foraging by these wasps. At that time nothing had been reported about this, though Williams (1919) has since made much the same observations as I did. Although my observations thus lose much of their novelty, I would still like to communicate what I have found in the interim.

I had already earlier noticed stenogastrines (probably P. mellyi and nigricans) collecting honey at the extra-floral nectaries of Ricinus communis, but I never saw them at flowers, nor did I ever come upon any taking prey. At my request the French specialist R. du Buysson made a microscopic investigation of some stomach contents, from which it appears that these consist of fragments of various kinds of insects. Upon further observation in the vicinity of the nest, I made the surprising discovery that these wasps prey on all sorts of small insects entangled in the webs of spiders. They have a habit of "standing" motionless in the air and repeatedly shifting abruptly to a new position. While thus hovering they closely inspect the entire surface of a web and then quickly pounce upon one or another of the entangled insects and pluck it from the web. They then fly off so swiftly that it is difficult to follow their route.

With the puzzle thus solved, I knew where to look for foraging wasps. The outbuildings of my house had an abundance of spider webs under the eaves, where I could observe foraging on any day I chose. I have not observed the wasps to take the spiders themselves, though the possibility cannot be discounted. Although these particular observations are limited to two species of Parischnogaster, I think it is likely that a similar mode of foraging will be found throughout the Stenogastrinae.

Williams (1919) has since made observations on foraging which are consistant with mine. As prey of stenogastrines he makes mention only of "small and tiny midges", by which are meant such nematoceran flies as cecidomyiids, mycetophilids, chironomids, psychodids, etc. Although the webs on my outbuildings were too high to let me see exactly which insects the wasps pluck from them, it seemed to me that these comprised many different kinds of small, delicate insects, not just flies. And Buysson's examination of stomach contents revealed fragmented insects from various orders, including psocids.

Another question which called for solution concerned the feeding of the larvae. They are given a semi-translucent, pap-like substance with the appearance of starch-paste. I presume that the females prepare a special food from the insects which they collect, though I have no idea how they might accomplish this. A certain amount of this semi-translucent pap is deposited into each cell after an egg has been placed in the base of the cell.

Williams (1919) reached no conclusion about the source of this larval food. He doubted that it was of animal origin and notes that "it is otherwise quite uniform in consistency and color and rather difficult to reconcile with mastication and probably regurgitated midges". He further speaks of "a sticky, rather transparent ball of jelly-like food", of "the viscid lump of jelly", and states that "the larva is fed from time to time with a soft paste whose composition I did not ascertain, but suspect it to be a plant product". No evidence is given in support of this latter suspicion, and

I cannot believe that honey from extra-floral nectaries could be transformed into such a pap.

In 1908 in Batavia I found attached to a thin rootlet a nest consisting of several cask-shaped cells in a single column, each cell opening downwards. The cell walls show distince transverse bands where material of different colors has been used. Masses of the larval food were stuck onto the rootlet above and below the column of cells, forming rings around the rootlet. One of the two masses consisted of two or three parallel rings, and in other nests I have later found as many as five such rings. Wasps on the nest were often observed occupied with these larval-food reserves, whether adding to them or taking from them. Some wasps also showed the following peculiar behavior. Sitting with the body axis parallel to the rootlet, the wasp sharply flexes the abdomen under the body and forward between the legs until the tip of the abdomen meets the head. The mouthparts could then be seen to lick the anal opening. With intermittent pauses, the wasp is then actively engaged with the larval-food rings, though I was not close enough to see exactly what she does with them. It may be that the larval food is a product of the female gut and that it is collected in this manner. Alternatively, it may be that it has a different origin, whether this be animal, vegetable or mineral, and that the wasps merely add a preservative substance from the gut. After testing the larval food for the presence of starch by the addition of iodine - with negative results - I sent a small amount of it to Prof. Treub at Buitenzorg[4] with a request to look further into its chemical composition. The attempted analysis revealed nothing though, so that this remains an open question.

The species which makes these larval-food rings has since been described as Parischnogaster serrei (Buysson 1905), though Dr. van der Vecht (pers. comm.) considers this a junior synonym of P. nigricans. I have found several more nests of this species, always with larval-food rings, and in a museum I encountered some similar nests with the dried up rings still visible.

I collected the P. nigricans nest shown in Plate II Figure 2[5] in July 1910 near Semarang at an altitude of 50 m. It was based on a vertical piece of wire and comprised three capped cells, two open complete cells and about seven incomplete cells. The last few incomplete cells were very small and apparently just newly begun. Rings of reserve food can be seen above and below the column of cells. The wasp on the fourth cell from the top is a female.

I made only one test of the powers of orientation in P. mellyi. If a colony and its nest are enclosed in a rearing cage for one day, when the wasps are then allowed to fly out they unerringly find their way back to the nest. I covered the open side of such a cage with a piece of cardboard, leaving only a small opening at the top. After the wasps had learned to leave and reënter by this opening, I drove them all from the cage and then moved just the cardboard about 50 cm to one side. The returning wasps at first flew against the cardboard at the point where the opening had been, but they soon found their way to the nest, and when they later flew out they did not again mistake its position. This demonstrates that in order to find the nest the wasps, like honey bees, orient not just to what immediately surrounds it but also to features of the local environment. It further appears from this test that P. mellyi adapts much more quickly to a new situation than do honey bees, which keep returning all day to the old location if the hive has been moved.

I would like to make a few comments on some errors in the literature about stenogastrines. In his original description of P. mellyi, Saussure (1852) figured the nest like a small chandelier of three horizontal combs placed one above the other, but he showed it upside-down. This reversal has then been followed by Sharp (1899) and Schulthess (1927), though Sharp expressed some doubt on this point.

Schulthess (1927) stated that according to Williams P. mellyi is a solitary species. This is a misunderstanding, as Williams characterized only Stenogaster[6] eximius and micans as solitary and correctly regarded P. mellyi as social.

Saussure (1853-1858) described the nest of P. mellyi as gymnodomous, stelocyttarous and rectinidal, i.e. with a naked comb or combs, each suspended from a centric petiole. He mistakenly assumed, though, that the wasps construct the petiole. Rather, each comb is attached directly to and around the existing substrate. This is usually a thin root, a mycelium filament from a horsehair fungus (Marasmius equicrinus or another Marasmius sp), or quite often an indjoek[7] filament.

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Footnotes

1. A translation of "Aanteekeningen over Stenogastrinae (Hym., Vespidae)", Ent. Med. Ned.-Indië 1: 15-19 (1935).
2. Now further divided into six genera. (Trans.)
3. Now called Jakarta. (Trans.)
4. Now called Bogor. (Trans.)
5. The figure is a clear photograph of a typical nest of this species, showing just what the author describes. (Trans.)
6. Both now placed in Eustenogaster. (Trans.)
7. Injoek, or idjoek, is the black threads growing at the bases of leafstalks of the sugar palm Arenga saccharifera. (Author)

Collecting Reports

A FALL COLLECTING TRIP TO THE SOUTHWESTERN DESERT OF THE U.S.

by
Terry Griswold
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The last two weeks of September were spent collecting bees and aculeate wasps in the deserts of California and adjacent Arizona. The deserts had apparently received very little of the typical, if often spotty, late summer rain and for the most part showed little flowering. A major desert-wide storm during the trip suggested I should have waited a couple of weeks. Nevertheless, as is common in the deserts, there were a few pockets of vegetation which had received enough rain to be good collecting sites. These yielded approximately 3000 bees and aculeate wasps.

Collecting began in Eureka Valley, a remote part of the Great Basin lying east of the Sierra Nevada and Owens Valley. The isolation was brought vividly home when a flat tire occurred while driving on the rough and occasionally washed out dirt roads. I traveled over 80 miles and met but one other vehicle. Very little was in bloom here or in Owens Valley other than the fall composites Chrysothamnus and Gutierrezia common along washes. Wasps were poorly represented by Microdynerus, Podalonia, Steniolia, and the pemphredonines Spilomena, Pulverro, and Ammoplanus. A similar wash on the road between Owens Lake and Panamint Valley was much more alive. Additional genera taken here included Maricopodynerus, Oxybelus, and Timberlakena. South of Death Valley we explored the Kinston Range, an area I had long wanted to visit on the assumption that it would have a unique fauna similar to that found in the New York, Providence and Granite Mountains directly to the south. But it was disappointingly like the Inyo County region I had just been through. Perhaps at a different time of year.

The eastern Mojave was good collecting as usual, though the bloom on the Kelso Dunes was on its way out. Roadside collecting on small composites and mat Euphorbia yielded the usual nice variety of small wasps: chrysidids, Tachysphex, Solierella, Miscophus, Belomicrus, Spilomena, Ammoplanops, and Timberlakena.

The sandy washes around Clarks Pass east of Twentynine Palms had apparently received good rains and presented some of the best collecting of the trip. Ammophila were so abundant it was only with difficulty that I was able to avoid them. Particularly exciting were good series of Plenoculus cuneatus and Oxybelus cocopa and two specimens of Trichogorytes.

Heading south, I expected good collecting in the famous collecting grounds west of Blythe, but met instead with a dirth of flowers and no bees or wasps. To my surprise all the washes south on the way to Glamis were similarly dry. The Glamis Dunes were much better. In fact the one and a half days I had to spend there were most inadequate. Large areas of the dune margins were carpeted with a small yellow composite, while on the dunes a bush Eriogonum was in full bloom. Over thirty genera of aculeate wasps were collected including scoliids, Myzinum, Dasymutilla, Chrysis, Maricopodynerus, Pterocheilus, Euodynerus, Ammophila, Prionyx, Cerceris, Aphilanthops, Misophus, Bembix, and Ammoplanops. Of particular interest were collections of Plenoculus fremonti, Stictiella villegasi, and what appear to be undescribed species of Microbembix and Plenoculus. Collecting on the dunes a week or two later would probably have been better as almost all specimens appear freshly emerged, with wings in mint condition and many species only represented by males.

80 MILES ON FOOT THROUGH KINGS CANYON NATIONAL PARK

by

Arnold Menke

On August 4 Woj Pulawski, my son Kurt and I began our backpacking trek into an infrequently visited canyon, the middle fork of the Kings River. Although this was primarily a vacation, Woj and I collected some wasps and other insects, so a report of the trip is in order. For those readers unfamiliar with Kings Canyon National Park, it is located in the Sierra Nevada Mountains of eastern California between Yosemite and Sequoia National Parks. The park contains some of the most spectacular high country in the Sierras and since there is only one short road that bearly penetrates the park boundry, Kings Canyon NP is essentially a hikers park. The winter of 1986-87 was unusually dry and the high country in the Sierras this summer was essentially devoid of snow, many small streams were dry, and meadows often brown instead of their usual green.

When we started the hike, Kurt and I had backpacks that weighed in excess of 50 lbs., Woj's was in the neighborhood of 40+ lbs. At the end of the 13 day hike, I had lost 10 lbs. (!) and our backpacks were at least 10 lbs lighter due to the consumption of all the food we carried.

We started at the Crown Valley trailhead just south of Wishon Reservoir (east of Shaver Lake) where the elevation is about 7000 feet. On the second day, about 10 or 11 miles into the hike, we finally reached a vista point on the edge of the canyon of the middle fork of the Kings River - what a view! Tehipite Dome, perhaps the finest in the Sierra, loomed to our left, rising 3600 feet from the floor of the canyon to its glacially rounded top. In the distance, a dozen miles up the canyon, ridges and peaks of the high country jutted upward to 12 and 13,000 feet. Within three more days we would be there. First, however, we had to negotiate several miles of very steep, very dusty and often rocky switchbacks down to the bottom of the canyon - some 3000 vertical feet! We exhausted our water before reaching the bottom and we were dead tired by the time we got to the river. One would have to be insane to attempt the reverse trip back up those interminable and often very steep switchbacks! We camped beneath trees just below Tehipite Dome and right next to the Kings River. Beautiful! We were totally alone in the wilderness - we would not see another person for two more days! The elevation in the canyon bottom was a little over 4000 feet and we would, over the course of the next few days, steadily gain altitude until we crossed Mather Pass at 12,100 feet. The canyon of the middle fork at Tehipite is one of the deepest anywhere. From our campsite at about 4000 feet on the floor it is over 7000 feet to some of the highest peaks on the south rim of the canyon. Fishing in the river around Tehipite produced some nice trout, but the best fishing was ahead of us. The next two days got us to Simpson Meadow, a two mile long grassy area 14 miles from Tehipite Dome. On the way we saw several rattlesnakes on the trail. Just before reaching Simpson, one has to cross the Kings River, not an easy feat since it is large, deep and contains many rapids. Normally the crossing is achieved via a high bridge, but two winters ago the Sierras experienced a "100 year" snowfall. The resulting spring snowmelt produced raging rivers everywhere in the high country and a number of foot bridges were washed away. The height of the middle fork of the Kings during this high water was incredibly high, some 20 feet or more higher than normal! Huge logs lined the banks of the river and one of them fortunately ended up laying across from one bank to the other,

thus offering the backpacker a means of getting from one side to the other. Crossing this log, which was some 15 or 20 feet above the rapids below, was a nerve wracking experience with a 50lb pack on your back!

Simpson Meadow was disappointingly brown in some spots and a fire had ravaged the area sometime during the past few years, but Ammophila were abundant and I collected with enthusiasm in the late afternoon. A. strenua was the most common, but I took one specimen of regina, and the "garbage" species azteca was present in fair numbers. At least two species of Podalonia were taken at this 6000 foot locality, as well as one species of Ancistromma. The next day I took Ammophila procera, regina and marshi, Prionyx parkeri (very dark like canadensis), and Mischocyttarus flavitarsis upstream from Simpson as we neared Cartridge Creek. Upstream from the confluence of Cartridge Creek with the Kings River the canyon is narrow and steep and the middle fork of the Kings is a spectacular series of cascades, rapids and falls for four miles. We camped just above the aptly named Devils Washbowl. Evidence of the height of the river during the very wet winter of two years previous was a huge boulder sitting in the middle of the stream with a log perched on top, some 20 feet above the current river level. Collecting along the trail near our campsite (7200 feet) produced more Ammophila strenua and azteca, as well as several species of Podalonia. A large series of blephariceríd flies were taken on the overhanging undersurface of a large boulder in the stream. A large dolichopod fly was also taken on the same site. The next day, farther up the canyon at about 7800 feet, I collected more Ammophila: regina, azteca, and marshi.

When we reached 8000 feet at the confluence of Palisade Creek and the Kings, we headed eastward up the former, camping at 9000 feet at Deer Meadow. Here we saw more effects of the heavy winter of two years ago. Snow had been so deep on Mount Shakespeare on the south side of the canyon that a huge snow avalanche had swept down off the mountain to the bottom of the canyon and part way up the opposite side. In the process thousands of trees were knocked flat, all in the same direction! They were snapped off just as though they were tooth picks. We saw the results of similar avalanches elsewhere on the hike. Ammophila azteca and strenua were captured at Deer Meadow, as well as some eumenids. We taught Woj how to play cards that night - up to that point he had never been exposed to a deck of cards!

The next morning we were finally heading for the true high country. After several miles of steep climbing on rocky switchbacks (the so called "golden staircase") we reached the Palisade Lakes situated at 10,600 feet and overshadowed by the 14,000 foot Palisade Crest to the east - what a sight! Magnificent. On the way up Ammophila azteca was taken, along with Podalonia and a few eumenids. We camped at upper Palisade Lake at an elevation of 10,700 feet. It got down to freezing at night, and very early the next morning with the thermometer reading 32° I just caught a glimpse of Woj running completely naked in the direction of the lake. In he plunged! After a quick swim he emerged grinning. As it turned out, he had been doing this every day without our noticing. We began calling him "iron man". Later in the day we arrived at the top of Mather Pass (12,100 feet) and spent an hour or so enjoying the terrific views in all directions of peaks in the 12-14,000' range. On the pass I spotted a Pseudomasaris, probably zonalis, and netted it. As usual, it was at its plant, a drab, innocuous species of Phacelia. Black species of Podalonia and Tachysphex were taken at the pass also, the Tx probably powelli. As we traversed Upper Basin containing the headwaters of the south fork of the Kings River on the south side of Mather Pass, I captured a chrysidid at about 11,600 feet as well as the endemic high altitude butterfly, Colias behri, which is a lovely greenish color. A large green tiger beetle (Cicindela) was grabbed here also.

The next day found us camped at Bench Lake at an elevation just under 11,000 feet. This large lake is crystal clear and full of large, delicious trout. A small black Crabro was taken here as well as another specimen of the green tiger beetle, and some anthidiine bees. The next day we camped at Lake Marjorie, an 11,200 foot elevation gem that sits beneath Pichot Pass and Mt. Pichot. Here it got down to 28° at night, but Woj still took his early morning dip. One Podalonia was taken. Later that morning we arrived on top of Pinchot Pass (12,100') after a chilly hike (high winds made it so cold that down vests, gloves and balaclavas were manditory). Inspiring views of the Palisade Crest to the north and of many high peaks to the south were the reward. More Pseudomasaris were taken on the pass, as well as a Podalonia. As we descended from the pass southward we collected along the trail. A fresh specimen of Parnassius was taken near the pass, and when we reached the Sawmill Pass trail junction at 10,300 feet we stopped to collect wasps in earnest. More Pseudomasaris were collected as well as the common Ammophila azteca and a Podalonia. Just prior to this location we had photographed Mt. Clarence King, a matterhorn-like peak of majestic proportions. We saw the little pond that now bears the name Ansel Adams Pond in

honor of the famous photographer. He once photographed the same peak with this small pond in the foreground. That night we would leave the John Muir Trail as we neared the end of our trek. We had been on this famous trail that keeps to the high country over its 200 mile route from Yosemite National Park to the top of Mt. Whitney in Sequoia National Park for about a week. As we left it, we felt like we were no longer alone because of the large number of hikers in the area. For nearly two weeks we had seen zero to perhaps 3 or 4 people per day. Now they were parading past our campsite at the trail junction (8400') like flies. Yuko. We had one more night to camp and two days to hike before we were back to civilization. We camped in Paradise Valley (6500') the last night along with about 20 or 30 other people. This area of the park has so many hikers that camping is restricted to certain areas and in Paradise Valley they even have bear boxes so that you can safely store your food at night (instead of hanging it up in a tree to keep it safe from bears). In Paradise Valley I captured more Ammophila azteca and strenua, and a species of Steniolia. The next morning we were on the trail at 7 A.M. and hiking the 6 miles remaining in slightly over two hours (it was all downhill). The hot showers at Cedar Grove felt terrific! We are already planning our next hiking adventure.

As a sort of postscript I should say that one interesting fact has emerged from the wasps collected on this hike and two previous ones that my son and I have made in the high country of Kings Canyon and Sequoia National Parks. It is becoming increasingly obvious to me that at least in the Sierra Nevada Mts. Ammophila rarely occurs above tree line (10,500-11,000 feet), while Podalonia is found well over 12,000 feet. High altitude, treeless basins like Upper Basin (headwaters of south fork of the Kings River - 11,400-11,900') and the headwaters of the Kern River (11,200-12,000') support many wasps like Podalonia, Tachysphex and Solierella, but no Ammophila have ever been taken.

EXCERPTS FROM THE 8th REPORT OF THE INTERNATIONAL SOCIETY OF HYMENOPTERISTS

Numerous symposia have been organized of the XVIII International Congress of Entomology to be held in Vancouver, Canada, July 3-9, 1988. Symposia, tentative speakers, and titles are all listed in the latest announcement put out by the XVIII Congress Secretariat (address for the Secretariat: Venue West Ltd, Suite 801, 750 Jervis Street, Vancouver, British Columbia, Canada, V6E 2A9). In addition to the symposium sponsered by this society (Biology of Insect Parasitoids from a Phylogenetic Perspective, with 26 scheduled speakers), there are 6 other symposia with significant hymenopterological components. These are: 1) The biochemistry, endocrinology, and physiological ecology of insect host-parasite systems (21 scheduled talks plus a keynote address by Ken Hagen on the sole of such studies in biological control); 2) Sex ratios in parasitic Hymenoptera (5 talks); 3) Parasitoids as selective forces in the ecology and evolution of insects (7 talks); 4) Predator and parasite aggregations and population dynamics (4 hymenopterological talks); 5) Evolutionary ecology of gall forming insects (at least 5 talks involving Hymenotpera); and 6) Genetic manipulation of arthropod biological control agents (at least 5 talks on Hymenoptera). PLEASE NOTE THAT REGISTRATION COSTS FOR THE CONGRESS GO UP ON MAY 15th.

The 3rd International Symposium on Trichogramma is scheduled to be held in Texas in 1988. More details in the next report.

"An initiative for the Study of Social Insects has been established at Texas A&M University with imput from Latin American Colleagues from Mexico, Venezuela, Colombia, and Brazil, and potential to expand as an international center for the study of social insects."

Membership in the society continues to grow. We now have 384 active members, an increase of about 8% since the last report. Our members now include about 30% of the hymenopterists in the World Directory. If you have forgotten to send dues for 1987, it is not too late: please send a check for $5.00 (U. S. or equivalent), made out to the Society, to Dr. James B. Woolley, Department of Entomology, Texas A&M University, College Station, Texas 77843 USA. As in the past, the Society will waive dues for anyone who has trouble with exchange or mailing of currency. However, we would still like to hear from these members to know that they still wish to receive mailings. Dr. Woolley reports that the Society now has a balance approaching $2000. Please send your ideas for the best use of this resource to Society officers. Presumably, initiating a journal will take care of any cash reserves that the Society has accumulated, but just in case it doesn't....

Nominations for the next slate of officers have been received from the membership. Ballots

will be enclosed in the next report. The new officers will take their posts at the meeting of the Society to be held concurrently with the International Congress of Entomology. Information regarding the place and time of this meeting will be circulated in a report as the Congress approaches.

SPECIAL PUBLICATIONS of the JAPAN HYMENOPTERISTS ASSOCIATION
and
HYMENOPTERISTS COMMUNICATION

These two publications have been discontinued. Katsuji Tsuneki, now retired and apparently no longer active, was the guiding force behind these two journals. He served as editor for both. A notice about their cessation, dated Nov. 30, 1986, accompanied issue #33 of the SPJHA, apparently the last number of that journal. The first issue of Special Publications of the Japan Hymenopterists Association appeared in November of 1976, and Dr. Tsuneki authored most of the papers that appeared in it. The Hymenopterists Communication was designed for Japanese amateurs and professionals and was entirely in the Japanese language. The first number was published in 1974. The final issue of Hymenopterists Communication, number 27, appeared in 1987 and included among other papers, a "brief recollection of my life" [i.e., Tsuneki, and unfortunately in Japanese - perhaps I can persuade Dr. Tsuneki to send us an English translation for Sphecos.] A nearly complete set of the Hymenopterists Communication (minus issue #5) is in the Hymenoptera Library at the U. S. National Museum. We also have all of the SPJHA.

Errata in Sphecid Wasps of the World

p. 43, RC, L 25: africana is correct
p. 78, RC, L 8: psilopus is correct.
p. 115, LC, L 24: pachyderma is correct
p. 172, RC, L 3: 1908 is correct
p. 172, RC, L 11: change "1910; Nigeria, Zaire" to 1908; Kenya
p. 173, LC, L 25: 1930 is correct
p. 173, LC, L 27: 1905 is correct
p. 185, RC, L 42: macilentus is correct
p. 318, LC, L 18 & 43: 1924 is correct, not 1925
p. 319, RC, L 8: 1924 is correct, not 1925
p. 393, LC, insert after L 15 as species: clarus Leclercq, 1957; Chile
p. 420, RC, L 27: (Thyreopus) is correct, not (Crabro)
p. 420, RC, L 28: delete dagger symbol and "nec Fabricius, 1793"
p. 473, RC, L 6: 1908 is correct
p. 511, LC, L 30: 1933 is correct
p. 527, RC, L 12: saharae is a subsp. of niloticus
p. 530, RC, L 18 from bottom: 1908 is correct, not 1910
p. 531, RC, L 8: laticaudatus is correct
p. 546, LC, L 8 from bottom: 1908 is correct, not 1910
p. 547, LC, L 19: 1908 is correct
p. 548, LC, L 20: 1908 is correct
p. 619, RC, L 5: change 1858 to 1857-1858 and emend volume and page information on L 8 as follows: 2(6):42-88 = Nov. 2, 1857 [no sphecid taxa]; 2(7):89-130 = Feb. 20, 1858. 1858 is the correct year for the following Smith species names in Sphecid Wasps of the World:

Ampulex insularis
Trirogma prismatica
Sphex diabolicus
Tachytes aurifex
Larrada carbonaria (now in Larra)
Larrada sycorax (now in Paraliris)
Larrada polita (now in Larra)
Larrada tisiphone (now in Liris)
Larrada alecto (now in Larra)
Larra prismatica (now in Bembecinus)
Pison suspiciosum
Pison obliteratum
Trypoxylon petiolatum
Trypoxylon coloratum
Crabro familiaris (now in Piyuma)
Crabro rugosus (now in Vechtia)
Mellinus crabroniformis (now in Psenulus)
Cerceris sepulcralis

TO A WASP, LOMAS IS A HONEY OF A PLACE

by Justin Schmidt

We all know of honey bees, those quintessential examples of hard-working, beneficial insects. But how many people know of the equally fascinating honey wasps?

Honey wasps are small, squat, caramel-colored social wasps, scientifically identified as *Brachygastra mellifica*, which live in large paper nests. These nests are a common sight in Lomas, especially attached to high branches on large *Bombacopsis* trees, those trees with large conical, chocolate candy kiss shaped thorns covering their trunks and large branches. Honey wasp nests are also seen on outer branches of *Tabebuia rosea* trees, those favorite big bee trees that are covered with a cascade of pink flowers in February. Although the nests are made of paper, these honey wasp houses are sturdy and do not wash away during torrential rains that occur during the wet season and are not destroyed by the frighteningly strong winds that sometimes blow through Lomas in the dry season. Paper for the honey wasp nest is really a sort of paper mache. The wasps chew wood fibers from weathered , but sound, dry wood and mix it with saliva to produce a tough durable building material. Honey wasps can commonly be seen in Lomas landing on fence posts and busily chewing the outer layer of wood to make their "spit balls" for home construction.

Honey? Yes, honey wasps are masters at making and storing honey. If one is brave enough to cut open a honey wasp nest, what is seen is paper honey combs filled with glistening beads of honey. How the honey wasps can store honey in paper combs without the paper becoming soggy and falling apart is not known; but somehow these marvelous little creatures have solved the problem. Most of the honey is stored in bottom combs nearest to the entrance, which is on the bottom of the nest. From a human honey hunter's point of view this is good. The honey hunter needs only cut off the bottom third of the nest and take the honey. The rest of the nest, the part filled with young of the honey wasp, is left. The wasps simply repair the damage and collect more honey. The practice of honey collecting from the wasps was so advanced that the Chorotega Indians living near Lomas in the Nicoya Peninsula had developed a cottage industry of locating nests and collecting honey. And what a treat the honey was—it is every bit as sweet and good as honey from bees.

In addition to making honey, honey wasps and honey bees have various similarities. Both live in large colonies, often with 20,000 or more adults. Both progressively feed their young, that is, they frequently check them and bring morsels of food (rather than putting their egg in a cell, filling the cell with food, and sealing the cell as do most sand or hunting wasps and most bees). Both have potent stings and are ever-ready to defend their precious young and stores of honey from predators. And both even have barbs on their stingers. The barbs serve to anchor the stinger into the flesh, thereby converting the attacking bee or wasp into a Kamikaze warrior. The stinger pulls from the body of the attacker, remains attached to the victim and continues pumping venom into the wound. Evolution of this "self destructive" phenomenon was a major problem for Charles Darwin. How could natural selection favor a suicidal trait? As discovered later, it turns out that sting loss is beneficial because the attacker, by giving up its life, helped save the colony from the predator and thereby allowed its sisters and the colony queen to pass on the family genes.

Although similar to honey bees, honey wasps also differ from their bee relatives in several ways. Bees are vegetarians that collect pollen and nectar from flowers to feed their young. Honey wasps are carnivores. They hunt and capture caterpillars and other insects and feed this meat to their young. Honey bees live in cold climates as well as the New World tropics, and are most abundant in the dry forests of Central America and Mexico. And finally, honey bees have only one queen whereas honey wasps have numerous queens, all living together and laying eggs in harmony.

We are fortunate to have such beautiful and fascinating little animals as the honey wasp living right in our midst at Lomas.

Author's note: This is the first of a series on wasps of Lomas. Future notes will be on the "artistic" wasp, *Parancharterqus fraternus*; the "warrier wasp", *Synoeca septentrioalis*; the "disagreeable wasp", *Polybia rejecta*; the "little wasp", *Polybia occidentalis*; the red wasp, *Polistes canadensis*; and various other ecological and behavioral aspects of wasps in Lomas.

Reprinted from "Bee Line" 1(1):10, the newsletter of the Friends of Lomas Barbudal (1987).

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SPHECOS 16:31 - 1988

FRIENDS OF LOMAS BARBUDAL

Bee Line

Volume 1 ••••••••••••Number 1 •••••••••• December, 1987

ANNOUNCEMENT OF A NEW TROPICAL DRY FOREST CONSERVATION ORGANIZATION

FRIENDS OF LOMAS BARBUDAL, Inc. (FRIENDS) is pleased to announce that it was certified as a nonprofit public benefit corporation by the Secretary of State, March Fong Eu, of the State of California, August 5, 1987.

Statement of Purpose:

FRIENDS OF LOMAS BARBUDAL is a nonprofit corporation dedicated to the conservation and protection of threatened lowland dry forest in Costa Rica. More specifically, FRIENDS will fundraise for the purpose of protecting the existing conserved dry forest areas in southern Guanacaste Province of Costa Rica, with emphasis on LOMAS BARBUDAL BIOLOGICAL RESERVE. Funds raised are intended for the following goals: securing critical habitat to be added to existing parks, refuges, and reserves, and securing support for management and protection of conserved areas.

A *NEW* Biological Reserve

LOMAS de BARBUDAL

in southern Guanacaste Province of Costa Rica

A NEW CONSERVATION COMPLEX IN SOUTHERN GUANACASTE

by Gordon Frankie

The combined area of Lomas Barbudal and the two conserved areas of Palo Verde Park and Refuge amounts to about 50,000 acres. Imagine this area doubled to include adjacent dry deciduous forest, riparian forest, oak forest, savanna, pasture, and fallow land. The Costa Rican Parks Foundation has asked FRIENDS to write a document on the feasibility of developing such a conservation complex. With a great deal of enthusiasm and no hard money in hand, FRIENDS has accepted the invitation.

FRIENDS plans to call on help from a variety of sources. A group in Cañas (CAE) has already indicated interest in the project. Their staff includes an economist, sociologist, and a rural agricultural specialist. OTS has also indicated initial interest in the project because of its investment in the Palo Verde field station and the benefits OTS students and scientists would receive through access to additional bio-diversity in southern Guanacaste. Finally, we are talking with two environmental groups in the San Francisco Bay Area that have expressed interest in the project.

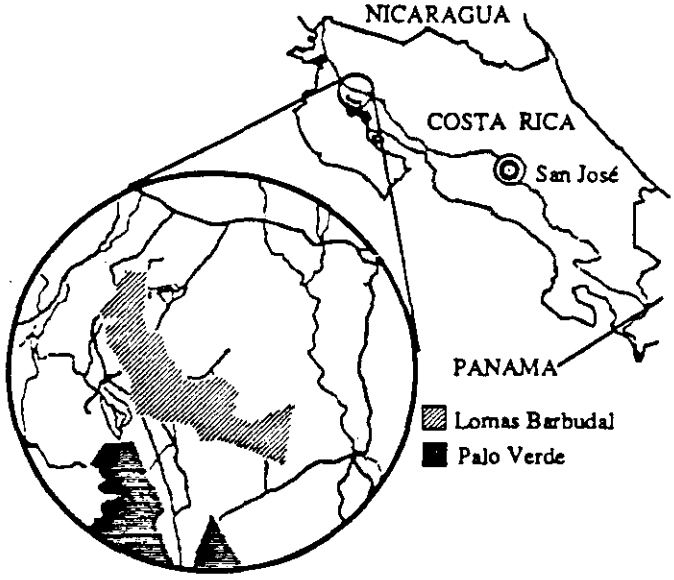
The envisaged complex will also include satellite parks and reserves such as Barra Honda, Playa Ostinal, and Playa Grande. Included in the plan will be a recommendation to establish Hacienda La Pacífica (Centro Ecológico) as a natural resource center for the entire region of southern Guanacaste Province. This recommendation parallels the goals of La Pacífica which seeks to develop an "ecological and tourist information center."

ROOTS OF LOMAS BARBUDAL AND FRIENDS

It is appropriate to begin this first newsletter by addressing two questions that are often posed to FRIENDS: How did Lomas Barbudal become a reserve and how did FRIENDS OF LOMAS BARBUDAL originate?

During 1968, the Organization for Tropical Studies (OTS) initiated a comparative ecosystem study between lowland wet and dry forests in Costa Rica. La Selva on the Atlantic side of the country was selected as the wet forest site, and the Palo Verde area on the Pacific side was chosen as the dry forest site. Palo Verde, owned at the time by the Stewart family, was originally made up of seven subareas (see map on next page). Together, these subareas represented a considerable amount of diversity. The Stewart family provided OTS with the opportunity to use their land for education and research purposes through a lease agreement that cost the organization one colon each year from 1968 to 1976.

OTS built a field sation at the Palo Verde area, a choice that was inspired by the adjacent fresh water marsh and nearby tall forest in subarea C. At that time, it was thought that the tall forest was one of the best remaining examples of intact dry forest in Guanacaste Province. The Palo Verde area was originally acquired by the Stewart family in 1923, as part of a 250,000 acre land purchase that stretched from the top of Volcán Miravalles to the Río Tempisque. Recent interviews with the Stewart family indicate, however, that the Palo Verde region has been selectively logged more than once since they purchased it. For a variety of reasons, most OTS ecosystem research and later studies at the dry forest were spread out over subareas A, B, E, and G ; very little research took place in and around Palo Verde. Today, biological research is being conducted in all but subareas A and H.

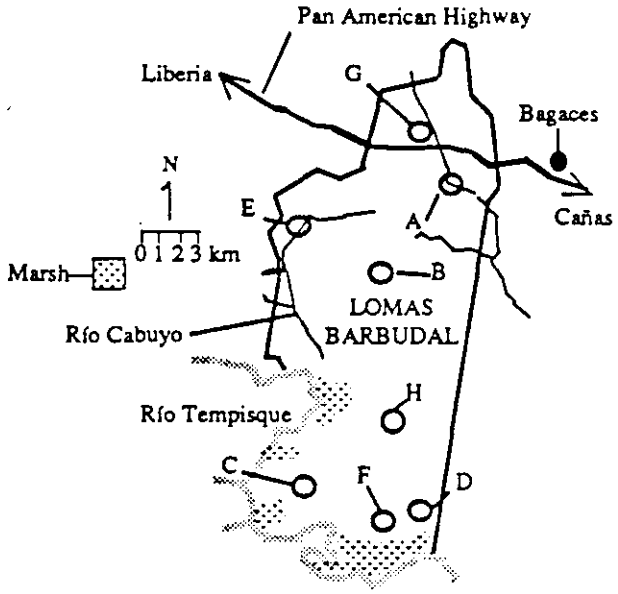


In 1977, major changes in land ownership occurred throughout the Stewart property. One of the changes was the transfer of a large area of the property to the Instituto Desarallo Agrario (IDA), the agrarian reform agency of the Costa Rican government. Included in the transfer was a relatively isolated hilly section known as Lomas Barbudal. In 1979, Gordon Frankie (University of California) and Bill Haber (Monteverde Conservation League, Costa Rica) conceived the idea of a wild bee reserve whose center would be a large savanna within Lomas Barbudal. The idea was based primarily on early collections of bees throughout Guanacaste by these and other individuals such as Paul Opler, Adrian Forsyth, and Ray Heithaus. These collections indicated that the savanna and adjacent areas were richly endowed in terms of numbers of species and individuals.

In 1980, Gordon Frankie wrote a proposal to establish the general Lomas Barbudal region as a bee reserve. The proposal was updated in 1982 and the Heritage group of the National Parks Foundation, Costa Rica, used the updated document to develop a more complete conservation proposal in 1984. This larger effort was headed by Luís Diego Gómez, Rita Alfaro, and Mario Boza. On 23 January, 1986, Lomas Barbudal became an official biological reserve of the National Parks System of Costa Rica.

During 1986 and 1987 it became clear that the Park Service did not have the resources necessary to provide appropriate protection for the reserve. The deficiency was particularly noticeable with regard to the fire problem during the seasonally dry period from December through May. Fortunately, World Wildlife came to the aid of Lomas with a fire suppression grant for the 1987 fire season. Of equal importance were the positive responses from local people and institutions in Guanacaste Province that assisted with modest resources for fire suppression and other management efforts.

After February 1987, a group of concerned biologists and conservationists decided to form FRIENDS OF LOMAS BARBUDAL (or FRIENDS), a nonprofit, public benefit corporation certified in the state of California. The efforts of FRIENDS include fund raising for management support and providing technical assistance on matters relating primarily to biological assessment and protection of critical natural resources. FRIENDS has received continual administrative and moral support from the National Parks Foundation and other conservation leaders in San José, Costa Rica.



NEW RESIDENT DIRECTOR AT LOMAS

FRIENDS raised funds to support one year of salary (administered through the National Parks Foundation in San José) for the first resident director of Lomas Barbudal, Sr. Gustavo Martínez. Gustavo comes to the reserve with a strong background in biology, public relations and journalism. He is also experienced in working with construction and mechanical projects in the field.

Gustavo's skills will prove extremely valuable for the expected needs of the Reserve. Because of its close proximity to the Pan American highway and its unique biological resources, Lomas is expected to receive a great deal of attention from student groups, professional biologists, and from a variety of amateur and semi-professional naturalists, including bird-watchers, photographers, and journalists. Gustavo will be instrumental in introducing these people to the reserve, as well as working with forest guards and Park officials.

Gusatavo began working at Lomas Barbudal on October 1 of this year, and FRIENDS has already begun looking for a second year of funding for his position.

DIVERSITY: WHY LOMAS IS DIFFERENT

by John Barthell

The tropical dry forest is perhaps one of the most unique but overlooked types of forests in the new world tropics. Less than two percent of the original New World lowland tropical dry forest remains and less than a tenth of one percent of this is protected. With all the interest surrounding conservation of tropical forests today, it is ironic that so little attention has been paid to one the most endangered types of tropical forest.

The dry forest receives vitually no rainfall for half of the year followed by nearly continuous rains the remainder of the year. During the dry season, there is a dramatic contrast between the water-fed, evergreen forest regions and the extremely dry deciduous ones that surround them. Water sources like rivers, creeks, and springs serve as oases for mammals, birds, reptiles, amphibians, insects, and other animals in search of this precious fluid of life.

The Lomas Barbudal Reserve stands as one of the few remaining dry forests that has escaped deforestation in the New World tropics. But what makes it even more unique are the abundant water sources within its borders. Coursing through the northern portion of the reserve, the Río Cabuyo paints a swath of green through an otherwise dry and leafless environment in the dry season. A dozen or more springs percolate from a shallow water table at various spots throughout the reserve, providing relief and refuge for animals during the harsh dry season.

About 170 tree species are found at Lomas with unique tree assemblages found occupying special habitats in the Reserve. The guapinol trees, for instance, famous for leaving ambered artifacts from prehistoric times, prefer the moist soils of the river forest and areas of the reserve where subsoil water levels are high. The curiously textured indio desnudo (literally "naked indian") tree displays its peeling wafer-thin bark in the dryest regions of the reserve. Upon closer examination, the bark surface of this tree takes on a nearly translucent green appearance. Light passes through the bark to special energy producing cells like those ordinarily found in leaves. This special strategy helps the tree to continue growing during the dry season when harsh conditions force it to drop its leaves to economize water loss.

Many tree species in this forest flower during the dry season. Often cued by subtle changes in the environment, a species may flower all at once, producing spectacularly colorful displays. The first good rainfall of the year causes the flower buds of the cortés amarillo trees to suddenly push open within a one day period — turning the once denuded, sadly inconspicuous tree into the pride of the forest. From a hillside at Lomas, one can see the trees checkerboard the

forest with bright yellow bursts. But almost as soon as it begins, the display ends and the trees reassume their comparatively drab form until the following year.

The brief splendor of cortés amarillo is a reminder of another diverse group that calls the dry forest home, namely the bees that pollinate these trees. It is estimated that about 250 species of bees are present in the Reserve, taking advantage of the abundant pollen and nectar sources given by the flowering plants. Both social and solitary forms of bees are found, each species with its own special set of food needs budgeted according to the flowering schedules of certain key plants. Some bees depend upon special oils produced by the abundant nance trees. In most parts of Guanacaste this tree is the one with a scruffy crown and gnarled, "every-which-way" trunk and branch patterns. Nances give up their beauty for the ability to withstand the wind-driven fires that may burn across the savanna early in the year. The nances at Lomas, many of which are rooted in especially deep and nutrient rich soils, are often enormous trees that produce dome shaped crowns covered with special oil producing flowers for many months of the dry season. Female solitary bees scrape at these glands to collect the oil and then carry it back to their nests to use for cell construction and for young bee larvae that will grow on a mixture that includes oil and pollen. The common occurrence of these trees is one important reason the bees are so diverse and numerous at Lomas.

As a reminder of just how important the special relationships are between plants and animals in the dry forest, the scavenging king vulture is often seen soaring above the tree tops. At Lomas Barbudal, it is a further reminder of the natural integrity of this site since this vulture (there are two others known in the reserve) is found almost exclusively in natural forest systems. Perhaps a prettier reminder is the courtship display of the long-tailed manakin that requires the special foods and plant architecture of the river forest to make its living. Named "toledos" by the local people for the melodic calls the male birds sing, this species is best known by naturalists for the dramatic dancing rituals it enacts each breeding season. The river forest is a favorite place for brightly colored trogans and mot mots as well. Preliminary counts put the bird species number at almost170, although this number is expected to reach about 200 as more experts explore the region. As many as 350 bird species are thought to reside at various times of the year within Lomas Barbudal, nearby Palo Verde Refuge, and Hacienda La Pacífica, a favorite "bird watchers' triangle" in Guanacaste.

In the early mornings especially, the eerie roars of several resident troops of howler monkeys can be heard. White-faced monkeys are also abundant, both species enjoying the luxury of year-round food sources found in the form of leaves, flowers, and fruits on the trees of the river and spring forests. Coati mundi (an overgrown racoon relative), white-tail deer, the rare tayra that is something like an arboreal otter, and other mammals also take advantage of these water-nourished sites. Since the official establishment of the reserve in 1986, many mammals have been given an opportunity to increase their numbers in response to the reduced hunting pressures in the region. The timid agoutis and pacas, important forest inhabitants because they disperse tree seeds, are making a strong comeback. About 65 species of amphibians and reptiles are also thought to be present in the reserve and a recently compiled list suggests that about 200 species of butterflies can be found in the Lomas Barbudal region.

The dry forest is a continuously changing natural resource. As the rains begin, the forest begins to exchange its leafless and dry character for a complex green one. With the new leaves come new insect species which then attract new types of birds and other animals. This transformation in forest appearance is a dramatic one. If one is lucky enough to see the transition from bare to green that occurs in the first weeks of the wet season one has witnessed one of the truly unique aspects of tropical dry forest diversity.

The differences between the habitats and seasons in the dry forest has been an intriguing subject for the scientific community. Over 50 scientific publications in fields such as botany, ecology, and entomology have emerged from studies based in the Lomas Barbudal region. Historically though, the dry forest has received less attention by conservationists. Rapid reduction of the dry forest in earlier times has perhaps made it easy to overlook, in comparison with the magnificant green rain forests with which most people are acquainted.

Little remains of the once ubiquitous dry forest. Although there is potential for some of the deforested regions to return to their natural composition after what could be decades of reforestation efforts, it is important to keep in mind the value of the real thing. Reserves like Lomas Barbudal let us experience the diversity of the dry forest now and serve as natural savings banks for plant and animal diversity in the future.

FRIENDS OF LOMAS BARBUDAL

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Logistics

The fastest and easiest way to reach Lomas is through the Pijije entrance, a small gravel road intersection on the left of the PanAm highway about 11 Km north of Bagaces. Turn west at intersection, go about 3 Km on good gravel road, pass over small wooden bridge (Río Cabuyo), continue for 400 m to wire fence gate and sign giving final directions to Lomas - about 3 Km along same road keeping to the left.

At present, Lomas offers few visitor facilities. A refreshment booth on the far northern border of the Reserve maintains a supply of drinks and snacks. The family who operates the booth also offers rustic accommodations, by prior arrangement, for the more adventurous. The nearby Río Cabuyo provides an inviting natural pool with flowing, clear water and a sandy bottom to take a swim and relax while enjoying the shade from the overhanging canopy where monkeys and birds relax during the afternoon hours.

In the future, a modest field station is planned for a site along the Río Cabuyo to accommodate participants in natural history classes, visitors on field trips, and professional biologists who need on-site accommodations.

CENTRO ECOLOGICO LA PACIFICA (5 Km north of Cañas) a patron of Lomas de Barbudal, offers short- and long-term accommodations ranging from the simple to delux, with a restaurant, pool, and much more (write to : Apartado 8, 5700 Cañas, Guanacaste Province, Costa Rica; phone 69-00-50). By special arrangement, La Pacífica offers transportation to the Lomas Reserve.

The nearby towns of Cañas, Bagaces, and Liberia are other possibilities for lodging, eating and shopping.

Scientific History

Lomas de Barbudal, Palo Verde Wildlife Refuge, and two adjacent subsites to Lomas (now deforested) made up the dry forest site of the early comparative ecosystem study initiated by the Organization for Tropical Studies (OTS). The study developed a wealth of comparative ecological information on lowland wet and dry forests, which has since become an invaluable resource for tropical biology. Since that time, Lomas has been used for field research (and occasional teaching) by numerous individuals whose efforts have produced classic scientific papers, with emphasis on reproductive ecology of flowering plants.

Presently, the Reserve and Palo Verde Wildlife Refuge are being used for a new study on the behavior and ecology of the invading Africanized honeybees.

Land Use History

Between 1923-1977, Lomas de Barbudal and a large area around the Reserve was in private ownership. At the beginning of this period, a small section of Lomas was used for corralling stock animals as they made their way from Palo Verde to the PanAm Highway for loading. Remnants of the stone corral walls can still be seen at two places, adding an interesting human aspect to the Reserve. More recently, between 1964 and 1977, the general area received limited livestock grazing. Fortunately, no selective or clear-cut logging was done at Lomas due to adjacent, more accessible flat areas, which yielded good quality timber. In 1977, the area became the property of the Instituto de Desarrollo Agrario (IDA), an agrarian reform agency of the Costa Rican government. Due to its largely hilly and rocky terrain, it proved of little value for agricultural endeavours to this agency, and the area was left alone.

A conservation effort from 1980 to 1986 by biologists from North America and Costa Rica, with the cooperation of the Parks Foundation, Costa Rica, resulted in a transfer of ownership of the property from IDA to the Costa Rican National Park System on 23 January 1986.

A considerable amount of land (about 20%) has been conserved in Costa Rica, and most of this is moist or wet forest in lowland or higher elevation sites. Very little of the conserved land is dry forest, one of the rarest and most threatened environments in Costa Rica and elsewhere in middle America.

LOMAS de BARBUDAL Biological Reserve, the most recent addition to the Costa Rican National Park System, represents some 6,000 acres of largely intact lowland dry deciduous forest. Its Spanish name aptly describes the Reserve's general appearance and setting as "bearded hills." Some of its biological treasures are described here.

Lomas is a special place. Within its relatively small area, it sustains seven distinct habitat types; two of which are described in this brochure.

The Reserve harbors the only conserved river valley habitat in southern Guanacaste - a section of the Río Cabuyo and several feeder creeks. The riverine water and numerous widely scattered perennial springs sustain important habitats and microhabitats for a variety of plant and animal species. Besides its wholly aquatic invertebrates and vertebrates (e.g., 7 fish species), a number of animals, especially some snakes, lizards, birds, and terrestrial invertebrates are highly dependent on the cool, moist environment provided by the water and evergreen vegetation.

Widely scattered springs also serve as critical drinking places for white face and howler monkeys, white-tailed deer, coatimundis, peccaries, anteaters, jaguarundis, ocelots, tyras, and other small mammals, as well as for birds, like the large crested guans among others (about 130 bird species have been recorded so far at Lomas).

Lomas also supports a myriad of insects and insect relatives, among which the Hymenoptera (bees, wasps, ants) play a major role in the ecological functioning of the Reserve. Bees, for example, are the most important pollinator group for about half of the flowering plants at Lomas and in all of Guanacaste. The solitary bees, in particular, are largely responsible for this occurrence. Early surveys throughout Guanacaste indicated that the Reserve contained an especially rich assortment of bees (about 250 species) and associated nesting microhabitats, a finding which inspired the Reserve.

The savanna mesa - a critical bee foraging and nesting habitat - is covered with native grass and dotted with gnarled *Curatella* and *Byrsonima* trees. Here one finds the greatest numbers and most diverse forms of these two characteristic savanna trees. The savanna also hosts an especially impressive specimen of *Byrsonima* with a 17 m crown diameter, making it the sentinel of the mesa.

A survey (April 1987) by forest geneticists from the Centro Agronomico Tropical de Investigacion y Ensenanza (CATIE) of Turrialba, Costa Rica, revealed that throughout the Reserve there are numerous excellent examples of dry forest tree species with superior genotypes, establishing Lomas as an important reservoir for timber tree seed resources, which will prove valuable for future reforestation in Costa Rica. Overall, about 170 tree and treelet species have been recorded at the Reserve.

Your Help Makes The Difference

To help Lomas de Barbudal help itself, please send your tax-deductible donation to:

FRIENDS OF LOMAS BARBUDAL, Inc.
691 Colusa Avenue
Berkeley, CA 94707 USA

In Costa Rica, your donation, made payable to FRIENDS OF LOMAS BARBUDAL, enclosed in an addressed envelope, may be left with the management at the Centro Ecológico La Pacífica.

Thank you for your support.

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May 9-11, 1988

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