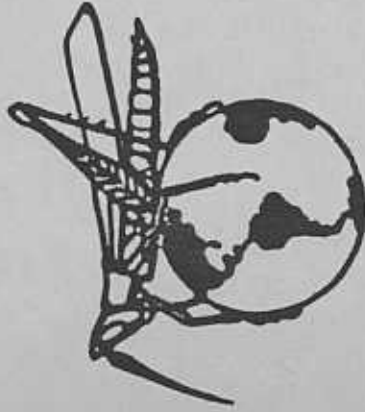


# METALEPTEA

SOCIEDAD PANAMERICANA  
DE ACRIDIOLOGIA



PAN AMERICAN  
ACRIDOLOGICAL SOCIETY

P • A • A • S

# METALLEPTA

VOLUME 5  
VOLUMEN 5

NUMBER 1  
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SOCIEDAD PANAMERICANA  
DE ACRIDIOLOGIA



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ACRIDOLOGICAL SOCIETY

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# P · A · A · S

M E T A L E P T E A

VOLUME 5 NUMBER 1 PAN AMERICAN ACRIDOLOGICAL SOCIETY  
VOLUMEN 5 NUMERO 1 SOCIEDAD PANAMERICANA DE ACRIDILOGIA

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## SOCIEDAD PANAMERICANA DE ACRIDILOGIA



PAN AMERICAN  
ACRIDOLOGICAL SOCIETY

The Pan American Acridological Society, or PAAS, is an international scientific organization with members in 24 different countries. Its purposes are to facilitate communication among those interested in, and concerned with, New World acridology, to encourage collaborative research and control programs in acridology among the countries of the New World, and to disseminate information and to promote, conduct, and foster other activities designed to increase knowledge and understanding of acridology and its implications.

Some 50 interested persons met at San Martin de los Andes, Neuquén, Argentina, in 1976, and planned a society, PAAS, that took its formal inception in 1978 upon the adoption of a Constitution and By-Laws. Since then, PAAS has been engaged in a full range of programs and activities toward the satisfaction of its above-mentioned objectives and was recently accorded tax-exempt status by the United States Government.

Approximately 100 persons representing 10 different countries met at Montana State University, Bozeman, Montana, USA, in 1979, on the occasion of the 2nd Meeting of PAAS. Over 300 persons representing 19 different countries registered at Maracay, Aragua, Venezuela, in 1981, on the occasion of PAAS' 3rd Meeting, held in conjunction with the IVth Latin American Congress of Entomology. Subsequent meetings are to be held on a triennial basis, with the next scheduled for 1984.

The 1981-1984 Governing Board includes President J. E. Henry, of Bozeman, Montana, USA, President-Elect V. R. Vickery, of Ste. Anne de Bellevue, Quebec, Canada, North American Representative G. B. Mulkern, of Fargo, North Dakota, USA, Latin American Representative Francisco Cerda, of Maracay, Aragua, Venezuela, Representative-at-Large Herbert C. Knutson, of Manhattan, Kansas, USA, Past President R. A. Rondros, of La Plata, Argentina, and Executive Secretary and Past President S. K. Gangwere, of Detroit, Michigan, USA. D. A. Nickle, of Washington, D. C. USA, is Editor.

The present publications of PAAS include a newsletter entitled *Metalepeta* and a triennial Proceedings.

PAAS membership is open to all persons, professional or amateur, with an interest in New World acridology by virtue of their research, teaching, or other activities.

SMALL-SCALE MAINTENANCE AND CULTURE OF ORTHOPTERA,  
ESPECIALLY ACRIDIDAE, IN THE LABORATORY

by

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Orthoptera are generalized, often large bodied insects widely used in today's biological laboratory, where they are readily maintained. Systematic, ecologic, and behavioral studies on them sometimes necessitates either temporary maintenance or long-term culture, and publications based on such research may include miscellaneous comments on rearing techniques. Nutritional studies invariably requires additional comments on rearing techniques. However, there are many papers concerned largely or entirely with the subject of rearing Orthoptera in the laboratory.

Much of this rearing literature is scattered through many journals. Consequently, to facilitate the efforts of persons interested in rearing Orthoptera, over two decades ago I published a compilation of rearing papers, together with my own observations (Gangwere 1960a). I have continued to amass citations, and my list has grown to over 200 titles. The obvious need for an update has prompted the present report, which emphasizes small-scale maintenance equipment and techniques for the individual orthopterist and relates particularly to Acrididae.

A Recommended System of Maintenance and Culture

Caging.

I recommend a cage consisting of a screen cylinder capped at both ends (Fig. 1). The cage body is a rectangular piece of aluminum window screening 46x76 cm, rolled widthwise, and the two ends stapled together to form an open-ended cylinder. The floor is a standard aluminum cake pan 23 cm in diameter and the ceiling a sheet of glass 25x25 cm. (If ready visibility of the enclosed insects is not important, a second cake pan may be substituted as the top in place of the fragile glass). All parts should be washed every few days and occasionally sterilized so as to assure hygienic conditions. This cage accommodates 15-20 individual grasshoppers about the size of *Melanoplus femurrubrum femurrubrum*, together with their food, water, and a dish for oviposition. Dimensions may, of course, be altered according to need; a smaller cage may be fashioned, for example, from two standard fruit jar lids in combination with a small screen cylinder.

#### Climatic Conditions.

Survival of grasshoppers is, on the average, enhanced under relatively elevated temperatures, reduced humidities, and occasional exposure to sunlight. Accordingly, cages may be kept on benches close to the windows of a dry, well-ventilated room where sunlight falls on them part of the day. In absence of windows, cages may be arranged closely around a 100-watt electric light, electronically or manually activated to provide illumination for approximately 12 hours per day. Cages may also be kept in a climate-controlled room, if available, wherein temperature settings of 26-32°C and humidity readings of 50% rh or less are recommended for most species.

#### Food.

Certain acridoidea, eg., *Aeoloplids* spp., *Metanoplus quercicola*, and *Schistocerca gerrardii*, are highly selective feeders, requiring particular food, and cannot be maintained in its absence. Others, such as the grass feeding gomphocerines, acridines, and truxalines, select more widely from within a particular food group. Most acridoidea, however, accept many plants from a number of different food groups and are more readily kept in the laboratory. Their foods may include grasses of the genera *Agropyron*, *Sporus*, *Dactylus*, *Phleum*, and *Poa*, and forbs of the genera *Lactuca*, *Melilotus*, *Plantago*, *Taraxacum*, *Trifolium*, and *Solidago*. These may be clipped in the field and their stems placed immediately into water-filled jars for transport to the laboratory. In the laboratory, they are washed with water and their stems placed in a water-filled 125 ml Erlenmeyer flask, one or two of which are then introduced into each cage.

Various laboratory foods may either supplement or substitute for native food plants. These include fresh, non-dry alfalfa and wheat (provided in the small clay pots in which were grown or clipped and placed in a water-filled Erlenmeyer flask) and lettuce or cabbage (thrown onto the cage floor daily). Dry laboratory foods include bran or oat flakes, chicken mash, and shredded dog biscuits or rabbit or guinea pig pellets.

A number of synthetic diets developed or modified for grasshoppers and locusts and particularly useful for mass rearing may be used either alone or in conjunction with the above foods. Examples are mixtures described by Dadd (1957), Howden and Hunter-Jones (1958), and House (1967). The latter report, a sort of "cookbook" of insect diets, is a compilation of references and abstracts of artificial diets for insects, some pertaining to Orthoptera.

A little experience will dictate the amounts and kinds of food necessary for given species. My general recommendations for small-scale maintenance and rearing are to provide for each cage an Erlenmeyer flask filled with appropriate native food plants, together with a little fresh lettuce and some dry bran flakes thrown on the cage floor. Synthetic diets are neither necessary nor desirable, except for mass rearing.

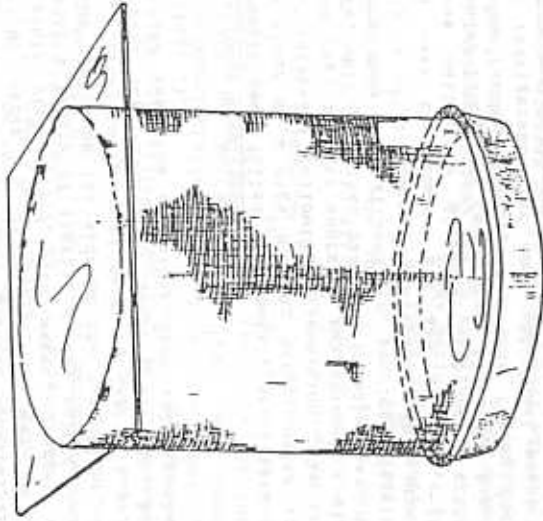


FIG. 1. Grasshopper cage.



FIG. 2. Water receptacle.

Water.

Grasshoppers generally do not drink in nature but obtain unbound water from their native food plants (Gangwere 1960b). In the laboratory, they are capable of obtaining water in the same manner from fresh food plants. Nonetheless, a continuous supply of water is desirable. It may be provided by a homeopathic vial filled with water, plugged with a wad of cotton or a length of sterile dental roll (Johnson and Johnson #3), and placed on its side on the cage floor. A lump of clay may be affixed to the vial near the lip or a paper clip may be bent apart sufficiently to enclose the lip, hold it off the floor, and keep the container from rolling when the cage is moved (Fig. 2).

Ovipositional Requirements.

A small bowl filled with moist, sterilized sand is placed on the floor of a cage holding mature males and females. At regular intervals following oviposition, the bowl is removed from the cage and its contents run through a sieve to extract egg pods, which are then reburied in moist sand in another bowl in which they are allowed to complete development, either directly or after undergoing diapause. This procedure provides control over the number and age of eggs. If the species undergoes obligatory diapause, the pods are kept at the recommended laboratory temperature (28-32°C) for a few weeks to allow for further development, then frozen for a time, and finally refrigerated for some additional weeks before being allowed to resume development at laboratory temperature.

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#### News from the President

Among the many things that have transpired since the last Newsletter, possibly the most pertinent is that a site for the 1984 PAAS meetings has been selected. Our site selection committee has recommended that we meet at Saskatoon, Saskatchewan, Canada. Dr. Al Ewen will serve as local representative and host. He will provide information on the area and facilities in *Metazlepteca*.

The only other area that was considered seriously was the Yucatan Peninsula in Mexico. Some members at the Maracay meetings had expressed an interest in that area, particularly should the South American Entomological Congress also convene there. However, in that we could not obtain necessary information from officers of that Congress, and because our Society does not have a member or contact person in that area who might serve as a local arrangement representative, the committee felt that we could not meet at the Mexican site at this time. In that many of our members are interested in that area, we should definitely attempt to establish the necessary contacts so that a future meeting might be held there.

In any event, I am confident that the membership will be more than pleased with the Canadian site. It has a great deal to offer in terms of natural acridid fauna, and the laboratory definitely is a leader in acridological research. The one concern we do have is the difficulty of travel from South America. We are making inquiries to agencies that might provide some financial support to our South American members. However, because the current economic climate in the U. S. has caused severe budgetary constraints for many funding agencies, we doubt that we will have much success in this country. Therefore, we suggest and encourage that all members begin now to seek out their own travel support. We will be glad to extend special invitations in instances where they might be used for added support.

Our petition to the International Union of Biological Sciences (IUBS) to become affiliated as the authority on acridology has been reviewed by their governing board, which has recommended that we affiliate with the entomology section. Although this would not be the capacity at which we had hoped to participate, one can appreciate the reason for their action, considering the numerous specialty areas and groups in entomology that might likewise request individual recognition. I can imagine that the IUBS would become very unmanageable, should they grant individual participation to so many fractionated groups. In view of that, and with expected consent of our Board of Directors, I am recommending that we do become affiliated with IUBS as a part of Entomology.

As some of you are aware, we are initiating our own Occasional Papers of the Pan American Acridological Society series. The first will be a paper, "Endocrinology of Acrididae", by M. P. Pener. Members of the Society will receive



a gratis copy of this and each subsequent Occasional Paper. Non-members and institutions will purchase copies at a minimum price of \$2.00 each, plus \$0.10 for each page in excess of 20.

The purpose of the Occasional Paper series is to provide the opportunity for members, as well as other scridologists, to publish manuscripts that are too lengthy for the usual journals. Accordingly, we encourage members to submit manuscripts, preferably between 20 and 100 printed pages, for inclusion in the Occasional Paper series. Manuscripts should be submitted to Dr. David Nickle, Chairman of the Publication Committee.

As a final item, you should be aware that the PAAS membership voted for expansion into a global society. We presently are looking at the means by which this should proceed. In the meantime, we are obtaining a list of scridologists throughout the world to whom we will send information about our Society and an invitation to become members. Our major concerns are the changes necessary in the makeup of the PAAS governing board, the constitution, and Society name to facilitate this greater stature. This will be a major topic of discussion in Saskatoon. In the meantime, we encourage input from members on this or any other matter concerning PAAS.

Again, I remind you to start now to seek out the financial support required for your participation at the 1984 meetings in Canada.

Good luck to you.

J. E. Henry  
President, PAAS

#### EXECUTIVE SECRETARY'S REPORT

President John E. Henry, in his recent report (*Metazetepca* vol. 4(2), p. 42), announced passage of both ballot proposals submitted to the membership. He left to me responsibility for providing the election data and results, which I give as follows. A possible affiliation of PAAS with IUBS (International Union of Biological Sciences) was approved by the PAAS voting membership by a margin of 35:1. A possible expansion of PAAS from Pan American to global status was likewise approved, in this case by a margin of 31:4. Accordingly, the Secretariat has moved on both these initiatives proposed by President Henry. Announcements relative to both may be expected in the near future.

Current membership includes, as of this writing (December 31, 1982), 122 persons of whom 5 are new members. And, of course, there are several cooperating agencies and institutions carried on our mailing list as dues exempt. A total of 90 of

our registered members express English- and 32 Spanish-language preference. A total of 55 of these persons live in the United States, 15 in Argentina, 11 in Canada, and the remainder in one of 20 other countries.

Inasmuch as PAAS is, by virtue of its specialized scientific mission, a highly select organization, the above membership totals are not disappointing though they could be greater. Upon the probable future assumption of global status, they doubtless will be greater even without active recruitment. Nonetheless, it appears to be appropriate to address the membership issue now, as is currently being done by the Membership Committee under the direction of President Henry and the Secretariat. Among actions being taken are included preparation of a new PAAS brochure and the amassing of a worldwide mailing list.

The current balance in the society bank account totals \$5,981.10 (US). out of this total, we must pay for the Bozeman Proceedings and the first number of our new Occasional Papers, both in press, so the above total is misleadingly large. Nonetheless, PAAS appears to be in a satisfactory financial condition such as will allow for payment of all outstanding bills. Consequently, no dues or fee increases are anticipated for the immediate future.

Heretofore, all PAAS monies have been deposited in a so-called "First Class Checking Account" in the National Bank & Trust Company, Ann Arbor, Michigan, USA. This kind of account does not pay interest. However, a recent change in U. S. banking laws makes it possible for the society to avail itself of a new kind of account, a so-called "Business Savings Account". Accordingly, all PAAS funds, except for a small working balance, will be transferred in January of next year (1983) into the new interest-bearing kind of account. As necessary from time to time, we shall transfer funds from the latter back into the former so as to pay society bills promptly. This procedure should provide adequate financial flexibility at the same time as it allows interest to accrue in our account.

Last year's financial statement follows.

S. K. Gangwere  
Executive Secretary

FINANCIAL STATEMENT 1982

BANK ACCOUNT BALANCE AS OF JANUARY 1 . . . . . \$2,274.35\*

RECEIPTS

Dues . . . . . 709.40

Page charges & publication receipts . . . . . 72.00

T-shirt receipts . . . . . 64.00

Jewelry . . . . . 55.00

Gifts & contributions . . . . . 4,390.93

Total receipts . . . . . 5,291.33

DISBURSEMENTS

Stationery & clerical supplies . . . . . 2.33

Printing & mailing . . . . . 1,305.52

T-shirt expenses . . . . . 245.50\*\*

Jewelry expenses . . . . . 0.00

Miscellaneous expenses . . . . . 31.23

Total disbursements . . . . . \$1,584.58

RECEIPTS LESS DISBURSEMENTS (PROFIT) . . . . . \$3,706.75

JANUARY 1 BALANCE + PROFIT . . . . . \$5,981.10

BANK ACCOUNT BALANCE AS OF DECEMBER 31 . . . . . \$5,981.10\*

Certified correct by T. H. Hubbell, Chairman, and  
I. J. Cantrall, Member, Audit Committee, on January  
15, 1983.

\* First Class Checking Account, National Bank & Trust Co.,  
Ann Arbor, MI, USA. All figures are in dollars (US).

\*\* Includes production costs of items to be retailed in the  
future.

NEW MEMBERS

Metzger is pleased to welcome the following new members into  
the Pan American Acridological Society:

- Mr. Tim Graham  
Department of Biology, UMC 45  
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- Ms. Philippe Le Gall\*\* e  
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Inst. Prof. Chillan  
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USA
- Dr. D. H. Van Horn\* e  
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Colorado Springs, CO 80907  
USA

NEW ADDRESSES AND STATUS CHANGES

## MEMBERS' NEWS AND ACTIVITIES

S. K. Gangwere, of the Department of Biological Sciences, Wayne State University, Detroit, MI, is continuing during the summer of 1983 as Director of his institution's Northwoods Biological Station. This beautiful field station is located in the Lake Superior Region, near Watersmeet, in Michigan's Upper Peninsula. Gangwere is planning this coming year's Northwoods program and invites inquiries. There will again be some partial scholarships available to qualified graduate or undergraduate students, and Gangwere would like to see some of these awards go to PAAS members working on grasshoppers. Please write him if you are interested in Northwoods course work or research.

D. K. McE. Kevan: "For some time past, events have occurred which have adversely affected the wellbeing of certain regions in which some of our friends and colleagues work. Without presuming to make a political statement, I would, however, cite a traditional orthopterological fable which seems pertinent to our troubled times. Since it was not known to me at the time, the story was not mentioned in my recent contribution on "The role of grasshoppers and crickets in Amerindian cultures" (Kevan, D. K. McE., 1983. Proc. 2nd Trienn. Meeting Pan Amer. Acridoi. Soc., Bozeman, Montana, 1979). To this it might possibly make an appropriate addendum, if the story is indeed indigenous and not a mestizo version of an European tale.

The fable is told by the Tarshuaras of Chihuahua, Mexico, and, with variations, also by the Nahuas and Chinatecos (see Scheffler, L. 1982. Cuentos y leyendas de México, tradición oral de Grupos indígenas y mestizos. Panorama Editorial, S. A., Mexico, D. F. 175 pp.: 50-51). It has something in common with an European fable best known in the early 17th-century French verse rendering by Jean de La Fontain, "Le lion et le moucheron".

## El Grillo y el Leon (= puma, cougar)

Un día un leon iba por un llano, muy quitado de la pena. Se detuvo en su camino y levantó una laja debajo de la cual estaba un grillo. El león, sin darse cuenta, pisó al grillo en una patita; el grillo gritó: ¡Epa! ¿por qué me pisas? ¿Acaso crees que no me duele? Si yo quisiera en dos por tres también te causaría daño. El león contestó: ¿Qué me vas a hacer tú, pequeño animal? Veremos, y para esto haremos una guerra. Tú juntas a todos tus amigos que serán tus soldados y yo junto a los míos y los enfrentamos. Entablaremos una guerra en la laguna y así veremos quien es el vencedor.

El león juntó a todos sus amigos que incluyen coyotes, zorras, tigres [=jaguars], osos y todos fueron al lugar señalado para esperar a los soldados del grillo y empezaron la lucha.

El grillo, por su parte, juntó a los jicotes, hormigas, abejas, avispas y otros insectos que fueron llevados hasta el lugar indicado.

El combate se inició, los partidarios del grillo picaron a los partidarios del león y los insectos eran tantos y tan pequeños que con facilidad ganaron al león y a sus soldados.

The moral of the story, which speaks of the justifiable annoyance of the "weak" cricket, resulting in his challenge to the strong, arrogant "lion", is that one should not trample on, or underestimate, those who are apparently insignificant. The outcome of a struggle and the handling of a situation do not, in the long run, reside in the relative size or strength of individual antagonists, but in the conviction and will of the majority. The cost of conflict, however, as is so often the case, is not considered, but there is doubtless another fable to cover that!

NOTICE

The IVth Triennial Meeting of the Pan American Acridological Society will be held in Canada on the Campus of the University of Saskatchewan at Saskatoon. The meetings are scheduled for Tuesday, July 24, through Thursday, July 26, 1984. Delegates should plan to arrive on Monday, July 23, and leave on Friday morning, July 27, 1984.

Accommodation and meals will be available on the campus at an approximate cost of \$145.00 Canadian funds (single room for 4 nights plus 3 meals per day; double room accommodation would be about \$120.00).

The tentative program includes three general symposia:

- (1) Dynamic Aspects of Control (including models, surveys, forecasts, etc.)
- (2) Endocrine Aspects of Reproduction in Grasshoppers and Locusts
- (3) Current Topics in Acridoid Systematics.

Symposia will be held during the mornings of Tuesday, Wednesday, and Thursday; submitted papers will be presented during the afternoons of Tuesday and Thursday. There will be a collecting trip on Wednesday afternoon and another of longer duration following the conference.

Saskatoon is a beautiful small city with a population of 160,000. It is served daily by two national airlines (Air Canada and Pacific Western) with direct flights from all major cities in Canada, and by one daily international flight from Denver, Co., USA (Frontier Airlines). The weather in July will be warm and dry.

Deadline for submitted papers (titles) has been set for May 1, 1984. Please consider this notice as the first call for submitted papers.

Submit to: Dr. Al B. Even, Local Chairman, PAAS  
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TITLE. . . . .

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