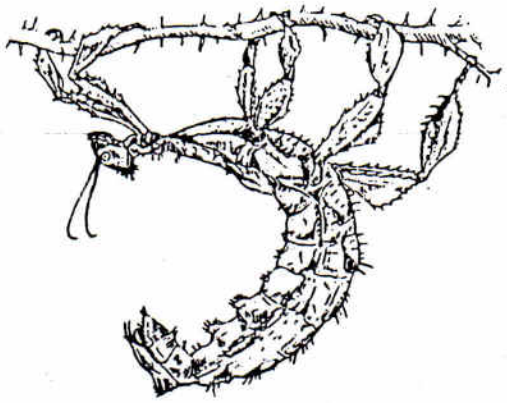
The Phasmid Study Group



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AGM REMINDER - 26th January 1991 in the Natural History Museum. Details enclosed.

SECRETARY WANTED - This mainly entails drawing up agendas for committee and members' meetings, and recording decisions at the former for compiling the minutes. Would anyone willing to do this work please contact the Secretary or Chair (addresses above) before the AGM.

Anyone wishing to stand for any other office/the committee please do likewise.

LIVESTOCK CO-ORDINATOR'S MESSAGES by Phil Bragg (No. 445)

I'm finding myself too busy to pack and post surplus livestock, although I can still manage eggs. In addition I now keep very few of the common species.

I have surplus eggs of PSG 106, but none of PSG 109 or 110.

SPECIES LIST CHANGES by Phil Bragg (No. 445)

PSG 90 has been named *Parahyrtacus gorkomi* Hausleithner, of the sub-family Lonchodinae. PSG 96 is a *Staelonchodes* Kirby sp., not a *Menexenus* Stal sp.

The following 10 species have been added to the list, under the usual headings:

103. unidentified	"THAILAND 8"	Necrosciinae	Thailand.	S	C	M	W	B. E. Ra. Ro.	(41)
104. unidentified	"THAILAND 7"	Necrosciinae	Thailand.	S	C	L	w	B. E. Ra. Ro.	(41)
105. Parapachymorpha spinosa Brunner		Pachymorphinae	Thailand.	S	C	S	-	B. Ro.	(40)
106. Oncotophasma martini (Griffini)		Heteronemiinae	Costa Rica.	S	C	M	-	B.	-
107. Bacillus lynceorum Bullini et al.		Bacillinae	Sicily.	P	C	S	-	B.	-
108. Bacillus whitei Nascetti & Bullini		Bacillinae	Sicily.	P	C	S	-	B.	-
109. Carausius abbreviatus (Brunner)		Lonchodinae	Sarawak.	S	T	S	-	B. E.	-
110. Hoploclonia gecko (Westwood)		Heteropteryginae	Sarawak.	S	T	S	-	B. Ro. O.	-
111. Eurycantha coriacea Redtenbacher		Eurycanthinae	New Guinea.	S	C	M	-	B.	-
112. Haaniella mulleri (de Haan)		Heteropteryginae	West Malaysia.	S	C	S	w	B.	-

The next issue of the Species List is planned for March 1991.

A SECOND STICK NAMESAKE by Michael and Frances (No. 3)

PSG 90 has been named *Parahyrtacus gorkomi* by Burghard Hausleithner (No. 132) in *Ent. Zeit.* 100 (1st August 1990) 262-89 (in German). This new species also represents a new genus which is related to *Hyrtacus* Stål and *Brachyrtacus* Sharp. It is described and illustrated, and named after Eric and Johan van Gorkom (No. 250), who collected it.

WHY NOT STUDY PHASMIDS?, BY PHIL BRAGG

This paper in the *Journal of the Derbyshire Entomological Society* (100 (1990) 13-21), after an enthusiastic introduction, covers rearing, behaviour, books, and the PSG, with five illustrations.

1990 AES EXHIBITION Report by Paul Jennings (No. 80) and Michael and Frances (No. 3)

Several interesting live species (a total of 13 including leaf insects) and a photographic display were exhibited by the PSG. As usual, our three tables attracted a lot of interest from the public, resulting in nine new members being recruited. About 30 members visited our stand, 11 of whom brought a total of 20 species to give away. Many thanks to all who participated.

Phil Bragg (No. 445) took his own tables to display 49 species (11 alive and 38 dead) collected in Borneo. Particularly striking was an unidentified one whose front legs formed a tube when placed together and in which the bulge further back was not the head!

James Penhall (No. 492) brought two beautiful and unusual Heteropteryx dilatata nymphs, both second-instar males, which he has bred. One was mainly chocolate brown underneath and on the head and thorax, but with cream patterning on the dorsal surface. The abdomen was a stunning mixture of chocolate, cream, fawn and mottled segments, and the legs were chocolate with cream bands. The second nymph was paler, being predominately cream, but with very attractive chocolate patches on the thorax and abdomen. No description can do them justice! Both nymphs had been kept at 70°F and fed on bramble, flowering cherry and ivy; other nymphs reared with them had normal colouring.

A female of a probably new species of Extatosoma was brought by George Beccaloni (No. 425). She was collected by him in Papua New Guinea and laid about 40 eggs. She is similar in size to an E. tiaratum, but somewhat more spiny and with pronounced mottling on her legs.

REMINDER - First Midlands Christmas Entomological Fair - 9th December, in the Granby Halls, Leicester. Contact Phil Bragg (0602-222118).

THE FRENCH GEP ENCOURAGES CHILDREN TO DISCOVER PHASMIDS
by Pierre-Emmanuel Roubaud (No. 415)

In Number 42 of the French monthly children's natural history magazine Wapiti (September 1990, pages 34-9) you can find an article about phasmids, initiated by the GEP. The lavish illustrations include photographs of five species and cage construction details. Unfortunately, the magazine has made a lot of mistakes: in the spellings of phasmid names, how often they should be sprayed, and with the cage - we never gave them information to build this sort of cage, as it becomes too dry!

However, we hope that many children will discover and develop an interest in phasmids. We have received more than 200 letters asking for phasmid eggs in only a few days! We send them a few eggs of easy species to rear, with information on how to keep them in good condition and about the GEP and PSG. We'll see....

SPONSORED STICK HOLD by Saul Springett (No. 341)

Michael Outred (No. 290) and I went down to our local area radio station (Invicta) to raise money for charity. The idea was for people to make a small donation to hold a stick insect - these were adult males and females of Eurycantha species (PSG 23 and 44). We raised £11.50 for the day and were personally thanked by the DJ "Caesar the Boogieman". We told one interested person about the PSG.

WHAT SHOULD WE DO WITH OUR SURPLUS? - A DILEMMA by Michael and Frances (No. 3)

The standard answer is that one should give surplus to other people, either as individuals or via the Livestock Co-ordinator. But sadly, all our experience, ever since the founding of the PSG, is that most given-away nymphs die, and this situation is not greatly improved if one tries to select the "better" breeders as recipients, since the welcome exceptions are all too few. But it seems to us cruel to give away surplus nymphs (or equally eggs for possible hatching) if one knows that most of the sticks will die unnecessarily - and this is our dilemma. Surely less cruel is to confine ones surplus as far as possible to eggs, and kill these eggs before they have time to develop significantly (e.g. by putting them in the deep freeze)?

THOUGHT FOR THE QUARTER - When you pick up your nice new sticks at exhibitions and meetings, how long do they live? - Nicholas Wadham (No. 358)

SPECIES CENSUS RETURNS 1990 Analysis by Mel Herbert (No. 232)

First I must apologise for the lateness of this analysis, due mainly to the pressure of teaching work related to the National Curriculum.

This year the census results may give a less accurate picture of what stocks are held within the Group as many members did not complete the form. Hopefully, a few of the species which appear to have been lost, or nearly so, are in fact being cultured by these members.

Established cultures reported were as follows:

PSG No.	1	2	3	4	5	6	8	9	10	12	13	15	16	17	18	19
No. of cultures	63	9	8	58	26	1	1	60	4	4	20	2	3	5	28	6

PSG No.	22	23	25	26	27	28	29	30	31	32	35	37	38	44	45	48
No. of cultures	22	43	7	1	2	1	1	2	17	23	5	3	2	14	2	6

PSG No.	51	52	57	58	61	66	69	73	80	81	82	84	85	86	87	89
No. of cultures	7	5	2	2	2	3	12	16	1	1	11	13	4	8	1	3

PSG No.	90	92	94	96	99	100	101	102
No. of cultures	7	3	12	2	2	2	6	4

Many members also reported having various species in culture but not yet established. A few species were reported only as non-established cultures, and these were:

PSG No.	20	36	39	47	53	59	72	74	93	97	98
No. of cultures	3	2	4	1	1	2	3	3	2	1	1

Obviously, if you have any of these non-established species, then you should take very great care of them - and even more so if you have any "lost" species!

Generally, numbers of established cultures are slightly up, but it is very worrying that less than five established cultures were reported for some 27 species and, of these, eight had only one established culture reported.

MUSEUM OF NATURAL HISTORY, VIENNA by Paul Brock (No. 26)

This Museum, together with the Museum of Fine Arts, was designed by Gottfried Semper and Carl Hasenauer and both are among the most representative buildings of historicism in Austria - the two symmetrically arranged buildings are quite superb.

Insects are to be found in number 24 of the exhibition rooms open to the public. A selection of 50,000 insects (about 10,000 species) is on display, including three cases of stick and leaf insects.

The Brunner von Wattenwyl and Redtenbacher collection includes 1164 numbered species (of which not far short of 800 are type [reference standard] species - mainly Brunner and Redtenbacher but also Stål and others). Section A12 includes a few drawers of unsorted material - very little has been added to the collection since the well-known monograph was published in three parts between 1906 and 1908. The collection is, not surprisingly, set out in a very similar order to this work. A few species are marked "new genus", for example No. 177 Paraphasma sp. Espirito Santo. The collection was built up with the help of museum colleagues and contacts worldwide, but in a number of cases data are rather brief. The collection clearly includes various synonyms but remains an outstanding point of reference, particularly as many of the descriptions in the monograph are rather brief.

IDENTIFICATION OF PHASMIDS: Talk at the sixth Dutch-Belgian phasmid meeting
by Paul Brock (No. 26)

When "new" stocks arrive in culture, or dead specimens are received, it can take a long time to make a definite identification. Let's find out why.

Difficulties of stick-insect taxonomy

1. Many species described from a single male or female only (but hopefully still in the museum collection concerned). Some "species" are known in which the female is included in one genus and the male in another!
2. Inadequate descriptions, particularly in the major work on the order by Brunner von Wattenwyl and Redtenbacher.
3. Considerable use in taxonomy of characteristics of poor phylogenetic value.,
4. Much confusion relating to Kirby's 1904 Catalogue of Phasmida, which lists synonyms treated as distinct species by Br.v.W. & R. It seems that there was no liaison between these well-known scientists, and the monograph excludes reference to Kirby's work.

Where do we start?

You will need access both to various publications and, if possible, to a good museum or private collection. Two fairly essential publications which can be examined at a museum are:

1. Westwood, J.O., Catalogue of Orthopterous insects in the collection of the British Museum. Part I, Phasmidae (1859).
2. Brunner von Wattenwyl, K., and Redtenbacher, J., Die Insektenfamilie der Phasmiden (1906-1908, published in three parts).

Both contain a number of accurate black and white plates; the latter includes an illustration of at least one species in almost all genera. These may lead you to other works published earlier or, if you are lucky, there may be more recent material.

First examine the plates to try to find a similar insect to the one you are seeking to identify. Pay particular attention to wing shape and size (if winged), spine formation, tip of abdomen shape, and general overall appearance and size. With luck you may find the exact species, in which case look up the description - likely to be in English (Westwood) or Latin (Br.v.W. & R.). This should inform you of the country/countries the insect is found in and give you notes on coloration, size, etc. In the latter publication you will also find a key to species in the genus, which is usually fairly simple to translate and often covers spine formation, wing colour, size, etc. Next try to find the species, or something closely related, in the museum's collection.

There are sometimes several nearly identical species in a genus. Try to establish the distinguishing features and closely examine these (for example, with Bacillus from Europe it is useful to use a microscope and carefully check thorax granulations, shape and size of cerci, etc, with recent papers).

The approach described is perfectly suitable for the beginner and should, at least, give many clues in identifying a phasmid to genus level. However, you must remember that many museum specimens were caught in the late 1800s/early 1900s and collections from remote areas in recent years produce undescribed species.

Species from some countries are relatively well studied but, even so, new species do turn up. Recent examples include:

England - Acanthoxyla inermis, the third British species; name of another species changed to A. geisovii (from A. prasina) (Brock, 1986).
Europe - Various new species distinguished: several Bacillus and one Clonopsis (Bullini, Nascetti, Scali, Mantovani et al.). Italian workers are very active in this field.
Malaysia - Phyllium giganteum (Hausleithner, 1984).

If you are examining insects from specific countries, it is good to have a knowledge of the literature published. For example, Japanese species are well covered by Shiraki (1935) - essential reading.

To be confident of an identification you must, of course, take all necessary steps to confirm it. I give below two examples of recent identifications and the steps taken to reach a conclusion in each case.

Acanthoxyla inermis Salmon

1. Obtained a copy of Salmon's Revision of Acanthoxyla (1955) after checking older literature.
2. Carefully examined the key, illustrations and descriptions before concluding the species was most likely inermis.
3. Checked various papers on New Zealand species and examined the Natural History Museum specimens of Clitarchus hookeri (name allocated by others).
4. Sent dead specimens to the National Museum of New Zealand for comparison with the types (standards).
5. Before publishing a paper, I established the origin of British stock (after much research work).

Pair of winged species from Bolivia

1. Examined plates.
2. Considered it most likely to be Pseudophasma (because it was similar in general appearance to Pseudophasma from other South American countries in my collection).
3. Checked key to Pseudophasma in Br.v.W. & R. and found what I was looking for: an insect with black and yellowish striped thorax.
4. Checked description of Pseudophasma flavipenne Redtenbacher - a perfect match, type from Bolivia (checked in Vienna Museum). This identification was really too easy!

How do you find out about more recent literature?

Well, a PSG member Ulf Carlberg (No. 28) has already published his Bibliography of Phasmida covering 1930-39; 1940-49; 1950-59; 1960-69; 1970-79; 1980-84. These lists have useful indexes of species and, although not exhaustive (omitting more-obscure papers), they are very helpful in researching species.

FIELD NOTES ON A COLOR VARIANT OF THE TWO-STRIPED WALKINGSTICK, ANISOMORPHA BUPRESTOIDES (STOLL), BY L. A. HETRICK
Some comments by Michael and Frances (No. 3)

This paper in The Florida Entomologist (33 (1949) (2) 74-7) mentions a "more typical" brown form of A. buprestoides, equal in size, but in which the front edges of the antennae segments are not always ringed in white and also the two dorsal light stripes are not interrupted by a black band at the rear edge of each segment. But in our own culture the interruptions are much more like splodges than bands and are only partial; also, our culture's light stripes are brownish rather than plain white. And Alain Deschandol (No. 238) is rearing two forms in which the light stripes are either plain white or chestnut brown, and his brown form is smaller than his white one although having the two distinguishing features of Hetrick's brown form mentioned above.

The eggs of Alain's brown form are darker and slightly larger than ours, their sculpturing is less, and the micropylar plate is the same colour as the rest of the egg (unlike ours) although the same shape as in our eggs.

Incidentally, Hetrick says that the black and white form eats oak (but ours won't touch it), rosemary and the tree lyonia. Also, they frequently rest in palmetto fronds, but do not eat them (ours do not like resting on their bramble); and the male often "mates" to an opening in the segment immediately in front of the normal genital segment.

FLATTENED FEMALE ANISOMORPHA BUPRESTOIDES DEATHS by Michael and Frances (No. 3)
From Newsletter 4, page 2

We usually get a few deaths of apparently flattened largish females - no, we haven't squashed them! We think that they may have recently shed their skins.

[We don't think this can be due to dehydration, as suggested in Newsletter 4, because our cages are fairly humid. We still haven't solved this problem. - Eds]

ANISOMORPHA BUPRESTOIDES GREGARIOUSNESS EVIDENCE by Michael and Frances (No. 3)
From Newsletter 4, page 2

We have a large cage with at least four suitable resting areas, yet the insects seem to huddle together in only two of these (not always the same two).

BEHAVIOUR OF ONCOTOPHASMA MARTINI (GRIFFINI) by Allan Harman (No. 189)

This species is a wingless phasmid some 75-90 mm in body length. The females are similar to Carausius morosus, Brunner; males are much more slender, smooth and shiny. The rear portion of the male's mesonotum is swollen, while the posterior femora are armed with some 5-20 spines (personal observation).

Both sexes were the commonest phasmid collected at Monteverde, Costa Rica, in August 1989. In captivity they feed on a variety of plants including bramble.

The males are particularly responsive to disturbance; primary defence is to drop to the substrate and walk quickly away. When males are seized by the thorax, the abdomen is flexed and curled towards the head in a manner reminiscent of a scorpion. In addition, the femoral spines are flexed and can be driven into the fingers.

[See also Robinson, Michael H., The defensive behaviour of the stick insect Oncotophasma martini (Griffini), Proc. R. Ent. Soc. Lond. (A), 43 (1968) 10-12, 183-7. - Eds]

DANGEROUS DEATH FEIGNING IN HAANIELLA ECHINATA by Michael and Frances (No. 3)

Our H. echinata adults are nearing the end of their lives, so it was no surprise to find one evening an immobile male in the standard slumped position of death. Not even our final test of placing him on a warm lamp-shade elicited any response whatever, so we put him aside to await eventual flushing down the loo - he remained immobile for the rest of the evening. But by the next morning he had disappeared, and we eventually found him as active as usual, some twelve feet away! He seemed to have completely recovered.

SUDDEN FEELER MOVEMENT IN HETEROPTERYX DILATATA by Michael and Frances (No. 3)

One of our last nymphal instar females, probably as a result of being disturbed, stopped waving her antennae and suddenly moved them to their rest position behind the head - usually this change is carried out gradually.

AN UNUSUAL STICK INSECT SWAY WE FORGOT! by Michael and Frances (No. 3)

Phyllium bioculatum (?) oscillate about a point, like the balance wheel in a watch. (For other unusual sways see Newsletter 43, end of page 10.)

VERY STRANGE BEHAVIOUR IN EURYCANTHA CALCARATA by Douglas Walter (non-member)

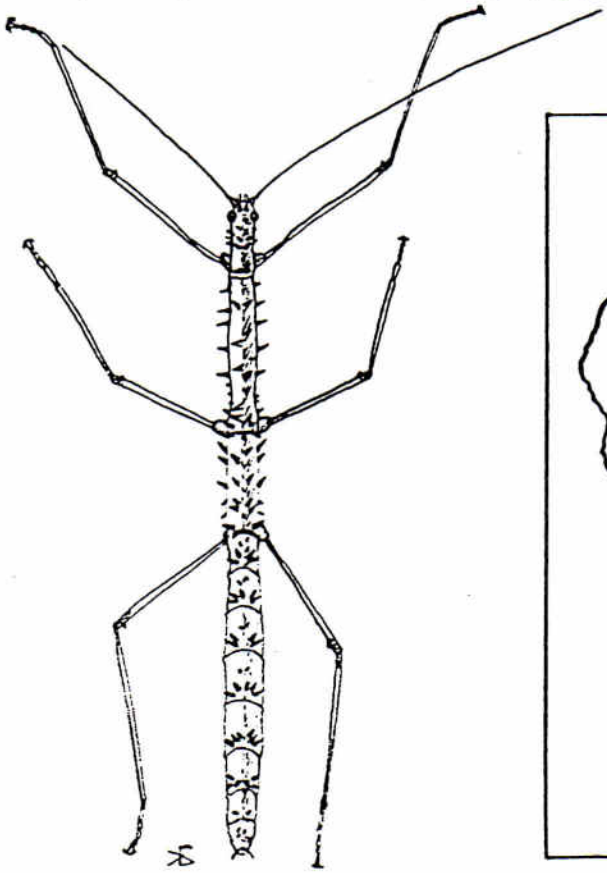
An adult male clung on to another who was dead, so that I was unable to remove the corpse!

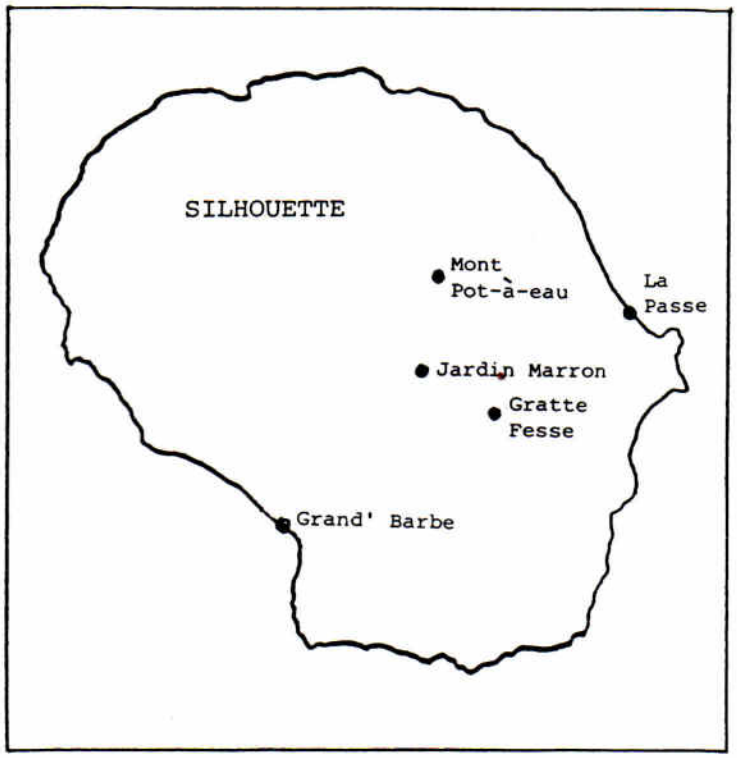
PSEUDO-MOULTING IN ACROPHYLLA WUELFINGI? by Matthew Gale (No. 770)

One of my A. wuelfingi nymphs has been exhibiting some rather unusual behaviour. She has just moulted to fourth instar and has spent the last several days since the moult trying, it seems, to moult again. She hangs upside down and keeps bending her head upwards. It's very exaggerated, looking as if she's trying to eat her ventral mesothorax! Her colouring is also unusual in that she has always been a sort of violet/green rather than the bright green of the other A. wuelfingi nymphs I've had. Also, the two protuberances on either side of her abdomen are very prominent for a fourth-instar nymph, being barely noticeable on other female nymphs of the same age. She hasn't started to eat again yet and, as she spends all her time pseudo-moulting, I doubt that she will survive. Has anyone else ever noticed this behaviour in A. wuelfingi or any other species?

OBSERVATIONS ON CARAUSIUS SCOTTI by Pat Matyot (No. 604)

Up to July 1990 only the male of Carausius scotti Ferrière, 1912 was known (Matyot, 1990). At around 11 a.m. on 11th July, while accompanying an Oxford University expedition led by Justin Gerlach to the island of Silhouette in the Seychelles, I discovered a female resting on a bird's nest fern (Asplenium nidus) growing on a granite boulder on the eastern slope of Jardin Marron, at an altitude of around 350 m. I suspected that the specimen was a female of C. scotti because of: (1) its coloration - yellowish brown with black at the articulations of the body and legs, which is also the coloration of the male; and (2) the spines on the upper surface of its abdomen - abdominal spines are also present in the male (Bolivar and Ferrière, 1912). Males and females were later discovered mating on several occasions.





Preliminary description of the female - The female measures 9-9.3 cm long and, as mentioned above, is usually yellowish brown, with black at the articulations. In some specimens, however, the whole body is dark brown or even a blackish colour (this has also been observed in males). As in the male, the dorsal surface of all the body divisions, including the abdomen, bears black spines. But in the female the spines are longer and more numerous, and as a result more striking. The drawing (by Katie Beaver) shows the overall appearance of the adult female (note that one antenna is broken in this specimen). The spines are distributed as follows:

Head - Two spines between the eyes (behind the antennae); at least four further back; one or two projecting horizontally on each side of the head, at the level of these four.

Prothorax - At least eight spines (two of them longer than the others and situated in the middle of the prothorax).

Mesothorax - Two rows of spines on each side (5-7 in the upper row, 4-6 in the lower row) and 7-9 spines on the dorsal surface, scattered to the left and to the right of the midline (occasionally one or two on the midline).

Metathorax - Two rows of spines on each side (3-5 in both upper and lower rows) and 4-6 spines on the dorsal surface, scattered to the left and to the right of the midline (occasionally one or two on the midline).

Median segment - Only two well-defined spines.

Other abdominal segments - Each segment (except the last two) can have up to six spines near the posterior end: a row of four at the back and two in front, as wide apart as, or slightly wider apart than, the outermost rear ones. In front of this arrangement (in which one or more spines may be reduced or absent) there are 2-6 smaller, irregularly arranged spines or tubercles. On the ninth abdominal segment all these spines are reduced to tiny spinules. On the tenth segment they are absent altogether.

The arrangement of the body spines is never perfectly symmetrical (because on all the body divisions some of them are reduced to spinules or tubercles or are completely absent) and varies slightly from one specimen to another. Similar variation exists in males - I have encountered specimens in which details of spine arrangement do not conform exactly with those given by Ferrière in his description (1912) of the male. This will be discussed later in a separate report.

Localities - Adults of both sexes as well as nymphs were observed in the following localities (see map):

1. The eastern slope of Jardin Marron, above La Passe (above 200 m);
2. The western slope of Jardin Marron, above Grand' Barbe (above 300 m);
3. Near Mont Pot-à-eau (450 m and above), including the Pisonia sechellarum forest where the Oxford University expedition carried out most of its research;
4. Near the base of the granite dome of Gratte Fesse (450 m).

The nymphs collected by Gerlach in April 1990 were in fact found in locality 1, and not in locality 3 as I erroneously reported previously (Matyot, 1990).

Foodplants - C. scotti was observed feeding on three species of fern: Asplenium nidus, Phymatodes scolopendria and Nephrolepis biserrata. The first two of these almost always grow as epiphytes on the trunks of trees or on granite boulders, while the third is often found in these situations although it grows mainly on the ground. C. scotti was encountered on all three ferns almost exclusively when they were growing on tree-trunks and boulders. On many occasions several specimens were found feeding or resting on the same fern. Once eight specimens (one female, three males and four nymphs) were seen on three fronds of the same Asplenium plant. On another occasion I came across seven young nymphs on the same Asplenium frond, with a male on another leaf of the same plant.

Feeding was observed only during the day. The earliest observation of feeding activity on any day was made at 8.46 a.m. and the latest at 6.50 p.m. Both were made in the Pisonia forest mentioned above, where peak feeding times appeared to be 9 a.m. - 11 a.m. and 5.15 p.m. - 6.15 p.m. At night the insects usually retired to the undersurfaces of Asplenium fronds, with their heads pointing towards the bases of the leaves (i.e. upwards in the case of pendulous fronds).

Other observations - In the Pisonia forest a nymph of C. sechellensis was once found on the same Nephrolepis plant (but on a different frond) as a nymph and a mating pair of C. scotti. Another time, not far from the same forest, a C. scotti nymph was discovered on Phymatodes growing epiphytically on a palm trunk, with a C. gardineri male on Nephrolepis further down on the same trunk.

Single males of C. scotti were often seen in the vicinity of mating pairs, and on one occasion two males were found attached to the same female: one was in the usual copulatory position, while the other was attached to the underside of the fifth abdominal segment of the female.

I have previously reported finding a parasitic fly on the other Seychellois Carausius species on Mahé (Matyot, 1989). What appears to be the same fly was observed on Silhouette on two occasions on males of C. scotti. On 13th August at around 10.30 a.m. one was seen with its mouthparts piercing a male C. scotti at the joint between the meso- and metathorox, above the base of the middle left leg. The phasmid was clinging to the underside of an Asplenium leaf and showed no sign of being aware of the parasite.

Conservation - C. scotti is probably the most threatened phasmid species of the Seychelles. Unlike the other Seychellois species, which are found on more than one island of the archipelago (Matyot, 1990), C. scotti is restricted to Silhouette.

Even there it is not very widespread, being confined to the indigenous forests of the central highlands - where it is most commonly found in association with the epiphytic Asplenium nidus (bird's nest fern). Any destruction of the surviving original vegetation in this area would be extremely detrimental to the species. The threat is not only from direct human interference (tree-felling, forest fires, etc), but also from the spread of introduced plants which prevent regeneration of the natural forest. One such exotic which appears to be spreading at an alarming rate is Clidemia hirta (Fam. Melastomataceae).

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Bolivar, I., and Ferrière, C., Phasmidae of the Seychelles, Trans. Linn. Soc. Lond. (Zool.), 15 (1912) 293-300.
Matyot, P., Notes on the stick insects of the Seychelles, PSG Newsletter 41 (1989) 5-6.
Matyot, P., Carausius scotti re-discovered, PSG Newsletter, 44 (1990) 6-7.

UPDATE ON THE NATURAL DISTRIBUTION AND THE FOODPLANTS OF CARAUSIUS SECHELLENSIS by Pat Matyot (No. 604)

C. sechellensis Bolivar, 1895 is the most widespread species of stick insect in the Seychelles islands. I have confirmed its presence on Mahé and Silhouette, but it was also collected at the beginning of the century on Praslin and Félicité.

On Mahé, I have found it at elevations of around 40 m at Hermitage (Mont Fleuri district) and 55 m at Marie Laure (Bel Ombre district) up to nearly 700 m on the slopes of Trois Frères and Morne Blanc in the Morne Seychellois National Park.

On Silhouette, the species has been observed at around 100 m above La Passe and Anse Lascars on the eastern coast up to the very top of Mont Pot-à-eau (620 m) and near the top of Mont Dauban (750 m).

The natural foodplants of C. sechellensis are ferns, including Nephrolepis biserrata, Dicranopteris linearis and, more rarely, Phymatodes scolopendria. But, in captivity at least, it will also accept the leaves of a very wide range of plants, from monocotyledonous ornamentals like the "good luck plant" (Cordyline fruticosa = C. terminalis) and "mother-in-law's tongue" or "snake plant" (Sansevieria trifasciata laurentii to broad-leafed shrubs and trees including (in the Seychelles) Pyrostria bibractea (= Canthium bibracteum), Tabebuia pallida and (in Europe) bramble (Rubus fruticosus).

RHODODENDRON AS A FOODPLANT by Allan Harman (No. 189)

At a Regional meeting of the Royal Entomological Society held in Sheffield on 28th November 1989, a short presentation was given on why rhododendron has so few insects feeding upon it. The plant itself has colonised large areas, so it is surprising that only some 31 species of insects have been recorded as feeding upon it in Britain. Perhaps the chemistry of the leaves gives a clue - about 57% dry weight of some tissues are phenols.

Interestingly, in my own experience, three species of phasmids will accept the leaves in culture. One is Anisomorpha buprestoides (Stoll), an aposematically [warning] coloured species which is also capable of discharging an irritant spray against would-be predators. Another, Orxines macklottii (de Haan), is a cryptically coloured species which also discharges an irritant spray. The third species is Rhaphiderus scabrosus (Percheron), which, as those of us who have reared it know, is brightly coloured. Although not noticeably aposematic, its bright green colour makes it obvious, so it may be offensive to would-be predators.

A fourth species, Agamemnon iphimedeia, Moxey, from Puerto Rico has been reared on rhododendron (Moxey, 1971). This species has defensive glands on the pronotum - although the gland is much reduced and in a 70 mm specimen is only 2 mm long, whereas in A. buprestoides of the same length the gland is 10 mm long.

In other orders of insects, vegetable toxins are stored within the tissues as a further defensive mechanism against predation.

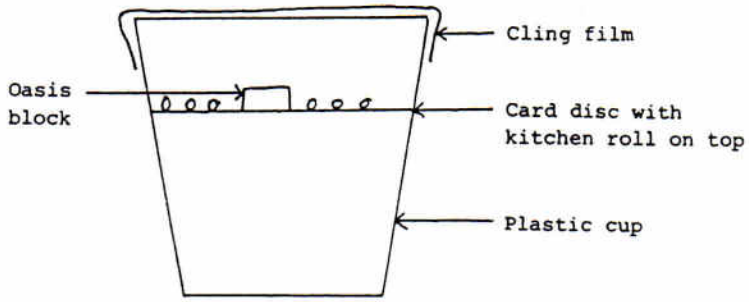
Possibly insects that rely on aposematic colouring and/or offensive sprays are more liable to eat plants which most insects avoid.

Reference: Moxey, C.F., Notes on the Phasmatodea of the West Indies: Two new genera, Psyche, 78 (1971) 1-2, 67-83.

USE OF FLORISTS' "OASIS" MOSS FOR FOODPLANTS AND EGG HATCHING
by Alan Longhurst (No. 862)

I have been experimenting of late in using florists' Oasis moss as a medium for keeping foodplants in good condition (instead of using a bottle of water). My method is to cut a block of Oasis about 3 inches cubed, soak it well and drain off any excess water. I put the Oasis on a saucer, push the foodplant stem into it and moisten the Oasis daily. Bramble will keep fresh for at least a week and, depending on the thickness of plant stem inserted, the Oasis will survive from two to four weeks. This method eliminates any loss of young through drowning.

I will also pass on my method for hatching eggs. I use plastic drink vending cups and place a disc of cardboard inside about three-quarters of an inch down. I line this with a disc of kitchen towelling and lightly spray it with water. I then place a small block of moist Oasis on the towel and put the eggs beside it, covering the cup top with cling film secured by an elastic band. Each day I remove hatchlings and apply two to three drops of water to the Oasis. Twelve cups will fit into a plastic seed tray which could be put into a heated plant propagator if required. Over 3 months results have been pleasing



HOW I HATCH MY STICK EGGS by Stan Pack (No. 99)

I use a clear plastic container with a fine mesh insert in the lid. I put a 50/50 mixture of silver sand and peat in the container to a depth of about 2 cm and keep this mixture moist.

For eggs that are dropped on the surface I do just that in the container. For eggs that are buried I rebury them and from time to time stir the sand/peat mixture with a pencil. I think that this stirring could simulate the scratching of a bird or animal in the natural state: I also seem to get a better hatch rate when I do this. Using these containers, I do not get any mould forming on or around the eggs.

HOW TO HATCH BURIED EGGS - OR NOT! by Michael and Frances (No. 3)

For many years we have advocated hatching eggs which are buried by stick females by reburying them in ground-up peat with their caps uppermost and just covered, and then incubating and moisturising the whole as normal (see our two notes on page 5 of Newsletter 29).

This has always worked well for us with the four egg-burying species we have kept, until the last couple of years when results have deteriorated with Eurycantha sp. (PSG 44) and Haaniella echinata although the system still gives good results with Heteropteryx dilatata (we can't write about E. calcarata as we have recently given this species up).

With H. echinata, hatching stopped altogether until we made the eggs some $5^{\circ}F$ hotter and much wetter than usual. But then some 80% of the nymphs refused to feed and died despite our best efforts - we must have tried some 30 combinations of foodplant(s), temperature, humidity and cages. We can't face a possible repetition of this and so are giving up this species also.

With Eurycantha sp., hatching became spread over a much longer than usual period and, more seriously, the resulting nymphs often had deformed legs and died during their first instar or at their first or final skin sheds. We also got many more females than males.

We appear to have solved the problem with Eurycantha sp. by now hatching the eggs simply on moistened tissues. However, this still leaves totally unanswered the questions as to why a hatching method which has worked well for many years suddenly gives problems, and why these problems are different with different species and do not arise at all in other species!

HATCHING ORXINES MACKLOTTII by Elizabeth Wraige (ex No. 7)
From Newsletter 6, page 3

I find that, if I bury the eggs in sand (about 3 mm down), the nymphs climb out more easily since the eggs seem to be held down.

ORXINES MACKLOTTII REARING FAILURES BY Paul Watts (ex No. 19)
From Newsletter 5, page 2

A remark from David Robinson (No. 29) (now see Newsletter 44, page 8) about his sudden inability to rear O. macklottii after several years' success led me to ponder whether there was more to this than meets the eye. It suddenly occurred to me that several other phasmidologists whom I have made contact with over the past few months have experienced similar problems with this species. Could it be that possibly the third or fourth generation in a particular breed becomes diseased - after all, a similar state occurs with the growing of strawberries; after about the third season, the stock ideally needs to be replaced. I have, however, come across this peculiarity in phasmids only with O. macklottii.

ORXINES MACKLOTTII SMELL QUERY from Michael and Frances (No. 3)
From Newsletter 6, page 2

Have we a chemist member who can find out if the pear-drops' smell of O. macklottii is the relatively simple organic compound amyl acetate (if we have remembered the name right from our schooldays)?

HOW DO STICK INSECTS BREATHE? by Nicholas Wadham (No. 358)

For a start, stick insects, as with all other insects, do not breathe through their mouths; these are for eating. They breathe through little holes called spiracles spaced all along the sides of the body. The spiracles are connected to tubes called tracheae; these are made of chitin, reinforced with spiral rings of the same material - a bit like the rings of collagen around our trachea. These rings keep the tracheae rigid and stop them from collapsing. The tracheae are visible outside the insect only when it has shed its skin. They can then be seen hanging from the empty cuticle, but this is not the entire respiratory system. The tracheae run from the tip of the antennae to the end of the abdomen, and even to the claws in the insect's feet.

The tracheae then narrow down, to microscopic vessels called tracheoles. In the tracheoles is fluid which dissolves oxygen coming into the body and carbon dioxide being removed from it. When the insect is at rest this process usually satisfies its requirements. However, during exercise, the increased metabolic activity by the muscles leads to the accumulation of respiratory wastes such as lactic acid ($CH_3CHOHCOOH$). This reduces the tissues' water potential so that it is less than that of the fluid in the tracheoles. When this occurs, the fluid in the tracheoles is drawn into the tissues in an attempt to balance the potential. Consequently, more air is drawn into the system, bringing in more oxygen to the tissues just when they need it.

The overall flow of air is controlled by a spiracular closing mechanism. Each spiracular opening is controlled by a system of valves operated by tiny muscles. It also has tiny hairs around it to prevent the entry of any foreign bodies and undue loss of water vapour. Increased activity leads to an increase of carbon dioxide in the body; the carbon dioxide is detected by chemo-receptors, and the spiracles are opened accordingly. Ventilation movements by the body may also be stimulated at the same time, especially in larger insects such as Eurycantha calcarata. Dorso-ventral muscles flatten the body, thus reducing the volume of the tracheal system and forcing air out (expiration). Inspiration is achieved passively; the insect's body relies on its elastic nature, and the body segments return to their original shape.

Though the spiracular/tracheal system is a highly effective means of gaseous exchange, it must be realised that it relies on gaseous diffusion through the body, and this will and does impose severe limitations on the size which insects can achieve. So your stick insects won't be much more bulky than Heteropteryx dilatata.

STICK INSECT HUNTING IN MALAYSIA - 1990 by Paul Brock (No. 26)

Malaysia has always fascinated me and, after several years of mainly visiting southern Europe in search of almost identical Bacillus species, I eventually decided to try some jungle collecting in a country well known for phasmids. Luckily the cost of reaching Malaysia fell and I booked a 12-night "package" from 25th May 1990 - along with my mother and sister.

I did a lot of research before the trip - this included reading up on relevant articles, for example Tony James' (ex No. 1) notes in Newsletter 32 (pages 5-7; no longer available). I also saw Allan Harman's (No. 189) dead specimens and other Malaysian material at the Natural History Museum in London and Westwood's types at the Oxford University Museum. I already had a good working knowledge of the Malaysian fauna through many dead specimens in my collection (mostly with thanks to Michael Yeh (No. 192): one parcel he sent me included a stunning assortment of species with wings set - reds, yellow, white, black and transparent!).

Letters were received answering various requests - in particular I must thank the following: Michael Yeh for much correspondence over several years including the first notes on finding a terrific new locality for phasmids; my friend from Switzerland, Victor Spreter (No. 473), and Georges Brossard (a colleague of Stephane Letirant (No. 665) at the Insectarium de Montreal) for very lively accounts of their trips to the Far East (both Victor and Georges readily provided details of Malaysian contacts); Allan Harman for suggestions of where to collect at Tanah Rata and Penang; and Bruno Kneubühler (No. 440) from Switzerland for a copy map of a collecting spot at Penang.

PENANG BUTTERFLY HOUSE - This has a tremendous range of butterflies from the Cameron Highlands - I was given a guided tour by Raymond Lim. On public display are a large cage with Phyllium on guava and also sections showing Tirachoidea, Lonchodes and more Phyllium. Above is a huge Phyllium display sign. I know some of our members who would be keen to obtain this sign, but Raymond mentioned that I was probably the first person really to appreciate it! There are breeding grounds which are not part of the public display area, including huge cages with a few Phyllium (three species - giganteum, bioculatum and siccifolium), many Heteropteryx dilatata, Tirachoidea cantori, Tirachoidea sp. and a very attractive species - Diesbachia tamyris. The thorax of D. tamyris is spiny and, although the insect's body is coloured various shades of brown, it has beautiful pink and black chequered wings. This species is bred on guava, like all the others mentioned above. The gift shop is very well stocked indeed.

Later, I had the pleasure of meeting David Goh (No. 863) - owner of the Butterfly House and very knowledgeable on the Malaysian insect fauna. At his house, David showed me various species from Kedah Peak, which sometimes differ significantly from those generally found in the Cameron Highlands. These specimens will be housed in a "museum" collection at the Butterfly House, which will be of great interest to the general public and particularly to research workers.

PENANG - Unfortunately there were no pavements by the roadsides of Batu Ferringhi and, whilst some areas seemed to have reasonable prospects for phasmids, it was dangerous walking along the road for any length of time, particularly at night. The map Bruno Kneubühler sent proved useful and, although no specimens were found on the first visit to an area near the Golden Sands Hotel, an early evening visit produced three Lonchodes brevipes nymphs on large-leaved jungle plants.

I was informed by Raymond Lim that Lonchodes are found in the Butterfly House grounds and surrounding areas, and indeed a lady stallholder across the road showed me guava bushes which sometimes have specimens on them - none that day!

My researches in England revealed a few species, including winged ones, recorded from Penang, but night collecting and patience would definitely be needed to find them - although apparently Bruno's "Golden Sands" area specimens were found only in the daytime.

TERONAH - After meeting Michael Yeh and his friends Chris and Steven Siew at Ipoh following a 3-hour drive from Penang, we left for Teronah for daytime stick hunting.

Michael had not visited this area for 2 years and we had to ask permission to drive along the dirt track as bulldozers were in evidence. There has been a fair amount of logging here, and one wonders how much longer this locality will remain intact. The area is typical jungle terrain with maintained paths - the trees are tall and Michael, Chris and Steven came properly prepared with nets on extra-long handles. They were quite expert at catching the (usually) flying insects, knocked from tree-tops. I found the first insect by searching vegetation which had been eaten but found no more after that, whereas the others found six insects. I was delighted, but Michael seemed disappointed as he used to find a hundred stick insects a day at one time!

CAMERON HIGHLANDS - This really was the highlight of the trip. Most stick insects (and indeed other insects) are collected by the local Orang Asli (native jungle dwellers) in jungle close to the Tapah Hills. Our own trip with Michael and Chris into jungle areas revealed only one live insect - a very quick-moving, small, brown, wingless Paramyronides modestus found by Chris. I thought it was a nymph until it started laying eggs! Michael found a Marmessoidea rosea male in a spider's web. Again, they usually find more live insects in the daytime, but not on this occasion.

Michael took us to meet a local dealer from whom I bought a beautiful adult female Tagesoidea nigrofasciata (bright yellow and having large yellow wings with black borders), an almost dead Aruanoidea annulipes (another "beauty" with red wings) and two female nymphs of Phyllium giganteum. Later on we met the "butterfly king", who was at the roadside buying butterflies and other insects from local Orang Asli people, mainly children. Here we picked up a live female Ph. giganteum in a plastic bag used for collecting insects in the wild. Only the Orang Asli know the where-abouts of Phyllium and, because of the high prices paid, localities are kept secret.

It was tremendous to see birdwing butterflies near a waterfall - many Trogonoptera brookiana and also Troides. Colourful butterflies flit by on jungle walks.

Much higher up we reached Tanah Rata, and Michael found some very nice live insects including Orthonecroscia filum. After a short spell of heavy rain we started on the nearby jungle path to Gunang Jasar and at 7 p.m. found several species of stick insects (too many of them males!) on various low-growing plants within a short walk. Next day we met Bruno Kneubühler and in the afternoon, walking round the Parit Water-falls where Bruno had found some interesting species at night, I found a few nymphs. Unlike Europe (and indeed other parts of the world) where some species remain on or near their foodplants, the insects seem to be well hidden in the daytime, but when darkness approaches they crawl up the vegetation to feed and are easily picked up by torchlight. This was very noticeable on a night-time expedition towards Gunang Jasar. At 7 p.m. it was only just starting to get dark - this enabled us to walk further and we each ended up finding a beautiful little brown species with fin-like spines. The walk back also revealed other interesting species including a grass feeder, some very close to the start.

BRINCHANG BUTTERFLY HOUSE - This was recently opened beyond Tanah Rata and is well able to show species such at T. brookiana galore. A large cage houses Phyllium, Tirachoidea and Pharnacia acanthopus.

Malaysia certainly boasts some of the most beautiful stick insects in the world. Mainly because of temperature variations between the places we visited and the difficulties in obtaining foodplants, it was hard to keep the insects alive for long, but some eggs of various species were obtained. Further information on these will be incorporated in a paper to be published in due course.

Malaysia is also an excellent area for touring and we have many good memories of the country.

CHECKLIST OF SPECIES SEEN

Teronah

♀ Asceles inquinatus Redtenbacher
♂ Loxopsis conocephala (de Haan)
♂ Lonchodes brevipes Gray (+ nymph) [also at Penang]

♀ Aruanoidea roseipennis (Serville)
♂ Aruanoidea microptera Redtenbacher
♀ Sipyloidea sp. nymph

Cameron Highlands - Tapah Hills

♀ Aschiphasma hieroglyphicum (Gray)
♀ Orthonecroscia filum (Westwood)
♀ Aruanoidea annulipes (Gray)
♀ Tagesoidea nigrofasciata Redtenbacher [♀ described in the literature as Battacus schneideri Werner, but definitely the ♀ of T. nigrofasciata described earlier]
♀ Tirachoidea cantori (Westwood)
♀ Tirachoidea sp.
♀ Phyllium giganteum Hausleithner
♀ Paramyronides modestus Redtenbacher
♂♀ Diesbachia tamyris (Westwood) [at Penang Butterfly House]
♂ Marmessoidea rosea (Fabricius) [Marmessoidea marmessus (Westwood) is a synonym of M. rosea]

Cameron Highlands - Tanah Rata

♂ Paramyronides perakensis Redtenbacher
♂♀ Parasteneboea insignis Redtenbacher [Bruno Kneubühler, at Parit Waterfalls - these are Nos. 4 and 5 of Tony James' article]
♂ close to Carausius nodosus (de Haan)
♂♀ probable Micadina sp. [small, winged species]
♂♀ possible Neohirasea sp. (Lonchodini) [these are Tony James' Nos. 2 and 3; common at both Gunang Jasar and Parit Waterfalls]
♂ short-winged species [yet to be identified]
♂♀ small species with fin-like spines [yet to be identified]

Some identifications (e.g. Redtenbacher type specimens) were confirmed at the Vienna Natural History Museum in July 1990.

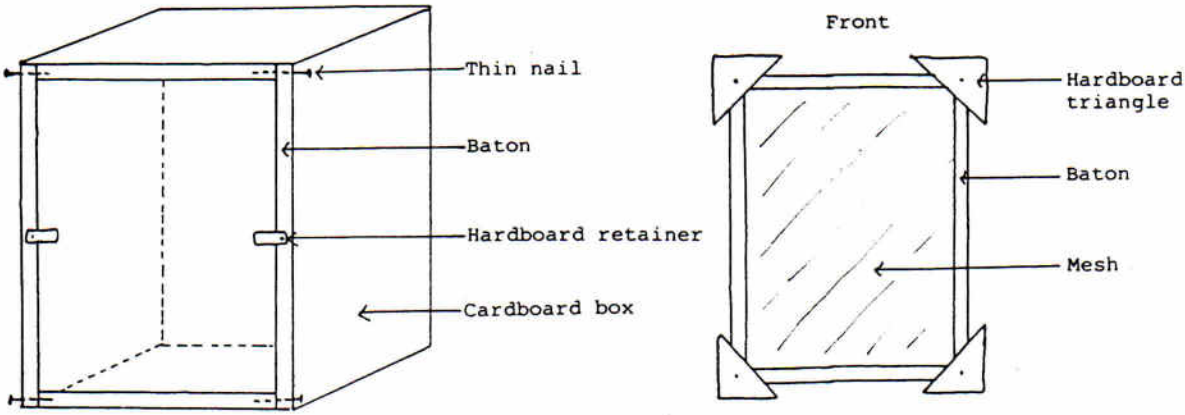
INEXPENSIVE, VERY LIGHT, CARDBOARD BOX CAGES by Stan Pack (No. 99)

The good thing about these is that you can destroy the boxes when they get soiled. Also, I find that a cardboard box will hold moisture in its structure rather than on the surface as with a wooden box of any type.

All you need is a carpet stapler, a lid-less cardboard box as strong as you can find, some wooden baton about ½ inch square, and some black mesh.

First cut four pieces of the baton to make a frame to fit just inside the opening of the box; fix them with staples through the cardboard from the outside, and join them at the corners with thin nails (the bottom baton serves to retain any frass, etc). Next make a slightly smaller baton front, tacking on four triangular pieces of hardboard to the corners to stop the front sliding too far into the box; cover the front with mesh. Push the front into the box frame and retain with two small, swivelling, elongated pieces of hardboard attached to the frame (as shown in the diagram).

The baton pieces and netting can sometimes be re-used for the next box.



EXTATOSOMA TIARATUM COLOURS by Michael and Frances (No. 3)
From Newsletter 3, page 1

After their initial "demented" stage, our first-instar nymphs lose the red head coloration and the head and body become a very similar shade of brown. Throughout the second and later instars, we have had a complete range of colours in both sexes, from a pale greenish cream, through orange-brown, to chocolate. In adult females the range of colours becomes much less pronounced, and our males are all much the same shade of brown. So colour does not help in sexing nymphs, which, in all but first instars, is much more easily done by the spines down females' backs.

EXTATOSOMA TIARATUM, SPINY OR NOT SO SPINY by Nicholas Wadham (No. 358)

In my culture of E. tiaratum I have two distinct forms, light brown and dark; but it doesn't stop there. The dark brown individuals all seem to be more densely armoured than the light brown ones; they are also a little bit smaller.

COLOUR AND BEHAVIOUR IN EXTATOSOMA TIARATUM by Elizabeth Wraige (ex No. 7)
From Newsletter 6, page 3

I have observed that the behaviour of my E. tiaratum sticks seems to be related to their colour, red ones being vicious and sandy ones being more passive, and that the colour of these sticks varies from red to sandy to occasionally green, even when reared in the same cage.

EXTATOSOMA TIARATUM DEFENSIVE SECRETION by Les Fox (No. 50)
From Newsletter 7, page 2

With respect to the article by Strong mentioned in Newsletter 6 (page 2), I tend to disagree with the idea that the liquid produced by E. tiaratum would disturb birds, as these have a poor sense of taste and virtually no sense of smell, hunting mainly by sight. This liquid, and those produced by other phasmids, would, however, prove effective against small mammals such as shrews, monkeys and oppossums, as these have a far more sensitive sense of smell. These smells may also serve as warnings to other phasmids, or at lower concentrations as sexual attractants to the more-mobile males, which often have longer antennae. Protection from birds is more likely to take the form of cryptic coloration and shape, and flash patterns.

EXTATOSOMA TIARATUM DEATH FEIGNING DIFFERENCE by Michael and Frances (No. 3)

When this species falls on to its back and feigns death, instead of remaining completely motionless like most other species, the legs quiver slightly.

MOBILITY OF EXTATOSOMA TIARATUM FIRST INSTARS by Michael and Frances (No. 3)
From Newsletter 3, page 2

We have recently measured the straight-line velocity of an averagely "demented ant" as 1.8 inches/second. Therefore, provided it doesn't find something to climb up and continues in a reasonably straight line, the dispersal distance, in 4-5 days, can be calculated as something up to 10 miles or so! On the other hand, one nymph went round Foyles Bookshop and all the record shops in Soho without escaping from a string bag!!

We have also seen an adult female moving at 6 inches/second at night.

WHY DO EXTATOSOMA TIARATUM HAVE EXTRA EYES? by Nicholas Wadham (No. 358)

In my E. tiaratum, the males have an extra three eyes on their foreheads; females seem to have them as well, but they are very small in comparison. I have also noticed the same in Acrophylla wuelfingi. I think this is something to do with their being winged species, because the males are able to fly and not the females, and so will need better eyesight - not to locate just foodplants but females as well. But seeing as these are the only winged species I keep, I cannot confidently say that this is so. None of my wingless species has these eyes.

EXTATOSOMA TIARATUM DRINKING by Sophie Allington (ex No. 39)
From Newsletter 5, pages 2-3

I have noticed with my insects that drink plays an important part in E. tiaratum's diet, and believe that the juice obtained from leaves is often insufficient for an insect in captivity. In fact, I have to carry out the tedious task of making them drink like babies from a plant spraying bottle. They are so used to this method, and indeed reliant upon it, that they have no hesitation in climbing up the bottle to clasp their feet around the metal spout and press their mouths to the spray-hole. Two of my insects have lived 2 years, and I think that the water has helped their longer life-spans as the temperature was always kept at a regular warm level for their metabolism. When one was particularly "getting on in age", I used to revive her with a drink, and a swaying body and deeper pigmentation always followed after a visit to the local water spray! I did try a pet mouse's hanging water bottle, but I think we have to admit our sticks aren't brainy enough for that. I wondered if any other members have "thirsty" insects at all?

FOODPLANTS FOR GIANT EXTATOSOMA TIARATUM FEMALES by Paul Inglis (No. 429)

At the Edinburgh Butterfly Farm I saw an E. tiaratum adult female which apparently has been measured at 155 mm. During the winter she was fed on bramble, but in the summer was allowed to feed for a few hours each day on plum leaves on a tree in the garden.

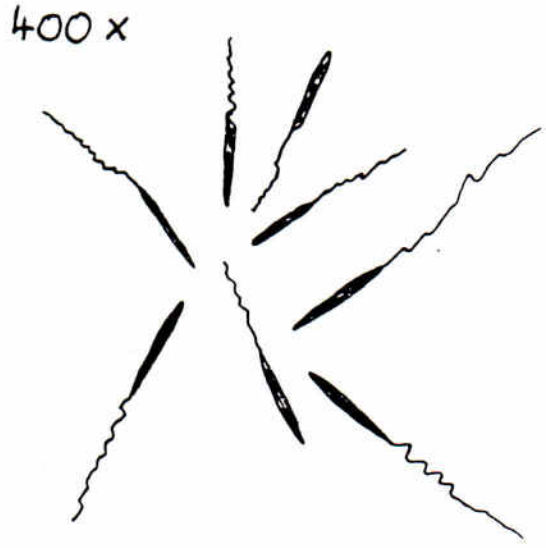
[The record seems to be 160 mm, quoted by Ulf carlberg (No. 28) in 1988. - Eds]

EXTATOSOMA TIARATUM WILD COLONIES? by M. E. Castle (No. 206)

It was in July 1988 that my wife and I regretfully decided to stop keeping phasmids for at least 12 months and turned the last tray of E. tiaratum droppings outside our bungalow (on the east side).

In July 1989 we found two E. tiaratum hatchlings on the outside wall of the bungalow, indicating that the mild winter and warm summer raised the local temperature to the point at which a wild colony could survive if they overwintered in the egg stage. Both specimens were female and of a standard pale brown colour. Since then we have had two males hatch outside and have reared a pair to adulthood indoors. We now have spare eggs of this perhaps robust strain - these eggs are the standard colouring and size.

AN EXTATOSOM TIARATUM SPERMATOPHORE by Adrian Harrison (ex No. 21)
From Newsletter 4, page 2



Recently I examined a spermatophore of a male E. tiaratum under a microscope. I found that the sperm are very odd in shape in that they have very long bodies, unlike human sperm. The diagram shows the sperm at 400 times their normal size. The sperm can stay alive for about a week in the spermatophore as long as the case is not punctured: without the spermatophore, the sperm die within a few hours. I found no evidence of food inside the case to sustain the sperm, although I did find a lot of alkaline fluid in which the sperm are stored. In some cases the tail of the sperm was twice the length of the body. Although most sperm had reasonably short tails, this could be due to breakages as the tail is very fragile. The sperm can move quite fast when they want to, but seem to prefer staying still and vibrating their tails.

NOTES ON PRESERVING STICK INSECTS by Paul Brock (No. 26)

Part 1: REARED SPECIMENS, ADULTS
From Newsletter 13, pages 5-6

For attractive displays, why not preserve the stick insects you breed, either in a straightforward manner, e.g. for a scientific collection, or, if you feel artistic, in a "natural" display, showing camouflage, behaviour, or defence action? The following account gives brief information. Please note that this information is gathered from my own experience, and others may have equally good or better methods.

There are variations on themes, but basically one must consider the insect itself: the large and robust species, e.g. Eurycantha, usually die in good condition and their bodies will not rot, but with some smaller species, e.g. Bacillus, and fleshy insects, e.g. Extatosoma females, the bodies rot quickly after death.

When dead, the specimens may be set out in the usual manner. Winged specimens look attractive with one or both wings spread out and, if two specimens are available, they should be set with wings open and closed. A flat solid piece of cork (1/4 inch thick) is useful for mounting.

If the specimens are kept dark for 2 weeks or so, depending on the species, the colours can be retained well. Fair results can be obtained with E. tiaratum females this way, but an alternative is "baking" them. Place them in the oven, when still warm, on cork or setting board, in the desired position. Remember to use a tin base for placing in the oven. This method causes the insect to shrink a little, and one must be careful handling it because it will be very brittle. Note that baking may be considered for species which have died naturally, especially larger species, if they are mounted before they begin to rot. Otherwise, if set and kept dark, they may remain in fair condition, although results are usually poor.

Another alternative is to cut the underside of the abdomen, remove its contents, and stuff the body with cotton wool. This is particularly effective in retaining green body colour, e.g. in Heteropteryx, as illustrated by specimens sent to me from West Malaysia as deadstock.

The largest specimens possible should be preserved - they often shrink a little whatever the method of preservation. If possible they should be perfect, and it is wise at the time to attach data labels, giving details of original locality (if known), date, foodplant reared on, and breeder's name.

Basic methods - (a) Keep dark (b) Bake (c) Stuff with cotton wool

Preferably (a): PSG 1, 2, 3, 4, 5, 6, 12, 13, 15, 17, 19, 20, 22, 23, 27, 29, 31, 35, 36, 37, 39.

Possibly fair results with (a): PSG 9.

Colours difficult to retain with (a): PSG 3, 6, 35 females.

Worth trying (b): PSG 9, 11, 13 females particularly, 15, 18, 20.

Worth trying (c): possibly PSG 9, 18.

Please contact me if more detailed information is required.

For Part 2: Preserved Specimens from Dealers/Individuals, see Newsletter 18, pages 3-5.

ON THERMOSTATS AND THINGS by Michael and Frances (No. 3)
From Newsletter 13, page 6

During a single night we find we get better temperature control in our cages without our Tropical Fish totally enclosed air thermostats (about 3°F variation instead of 5°F), so now we just keep an eye on the week by week temperature and change the wattage of the covered light bulb in our heater every so often.

Does anyone still want to buy two thermostats?!

PSG No. 48: APLOPUS SP.

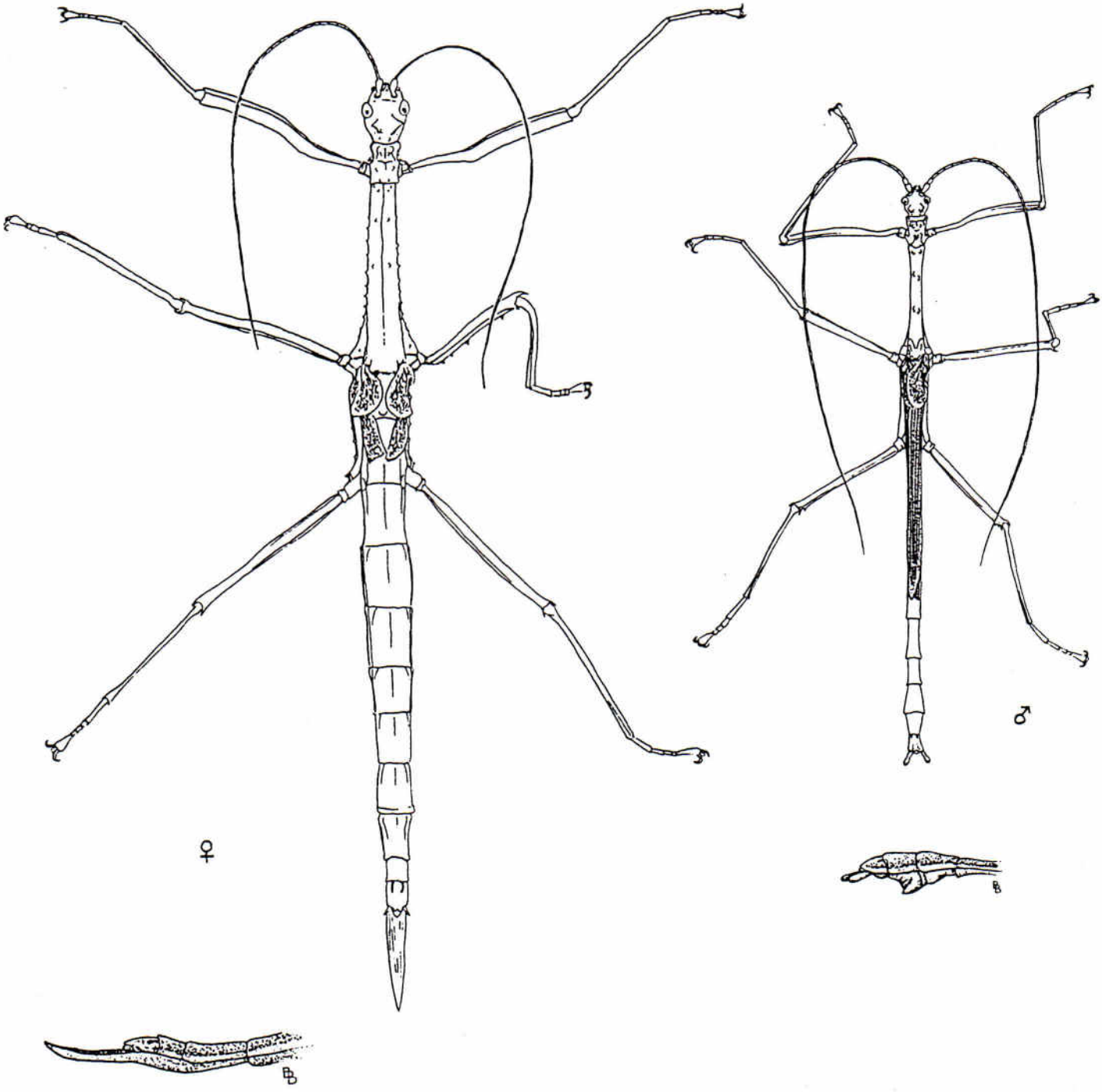
Updated from Report by Alan Gange (ex No. 17) in Newsletter 19

Drawings of adults and nymph by Bart Braakman; of eggs by Matthew Gale (No. 770)

Culture history: The original specimens were found in the Dominican Republic by Miguel Adams (ex No. 72) - see Newsletter 12, pages 3 and 4 (no longer available). "Local people (who are not always reliable!) say that these phasmids can kill!"

First described: Aplopus - Gray, 1835:34. There are 19 described species in this genus, at least four of which occur in the Dominican Republic, so it may be some time before this insect is identified to the species level. The genus has been mistakenly spelt "Haplopus" by some authors.

Range: Dominican Republic, probably also surrounding areas.



Adults: Differences appear to have arisen between cultures reared in the UK and specimens in their natural environment. Adult Dominican females were 15-16 cm in body length; those over here measure some 12-17 cm.

Female colour appears to be very variable, depending upon food-plant and culture conditions - see articles by Stan Pack (No. 99) in Newsletter 20 (page 2) and by Dave Grimwade (ex No. 12) in Newsletter 19 (page 6). "British" specimens are generally dull green or straw colour (with buff brown legs) but they can vary to all brown or all green (with a range in each of these colours), they may be mottled or differently coloured above and below, and the abdominal segments may have dark red or orange posterior margins. According to Stan, sticks fed on bramble from third instar all turned pale straw colour when adult, but those fed on wild rose had a wide colour variation from shades of browns to greens.

The head is usually dull green with large grey eyes, and bears two large spines. Dorsally, the thorax has numerous small spines, these becoming pimples ventrally. There is a small pair of wings which span about 3 cm and are completely useless for flight. They are transparent, heavily mottled with black, and are covered by brown elytra, also speckled in black. The cerci are small and there is a large sheath-like operculum, used to flick eggs away. The antennae are about 6 cm long; fore legs measure some 5.5 cm, mid legs 5 cm and hind legs 6.5 cm.

Dominican females had less of the green coloration, being shades of brown, varying to grey.

The male is a much more slender and often handsome creature. Usually buff brown or pale green above, he is bright emerald green below, with segmental joints picked out in cream. There is a cream stripe along each side of the thorax. Body length is about 9.5 cm, with antennae about 8 cm. The legs are pale green; lengths are: fore legs some 5 cm, mid legs 4.5 cm and hind legs 6 cm. There is a series of spines on the ventral surface of the femora. The head is buff brown, mottled with green, and also has two large spines. The wings are well developed and span 9 cm. They are transparent, heavily clouded with rose-pink, with the veins highlighted in brown. There is a black patch at each base. The elytra are brown with a white stripe along each leading edge. Flight is rare and poor, downwards only.

The original males were dark brown above and green below. They measured 11-12 cm in length.

In the Dominican Republic, adult males live for 5-6 months but females can live for 8-9 months. Because of this longevity, nymphs and "second generation" adults can be found together with their mothers. British specimens generally live for at least 6 months as adults, many much longer. Both sexes are very fond of water and will readily drink when their foodplant is sprayed. It is likely that they drink often in nature owing to the high humidity and intense heat.

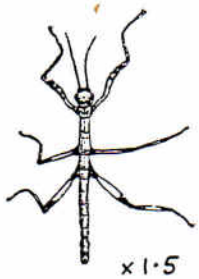
Adults appear to spend more than 30% of their time mating; but, if one looks closer, they are not, and perhaps the males are just keeping off other males, according to Michael and Frances (No. 3; Newsletter 20, page 2). They also noticed a male trying to mate before he was adult, the only time they have seen this in any stick species. Dave Grimwade (ex No. 12) had a male who visited a different female every night.

Ova: The egg is oval in shape, about 4 mm long and 2 mm wide. Generally cream in colour, it is heavily mottled with grey. The surface is covered in minute hairs. The micropylar plate is cream, or sometimes dark with a lighter outline (according to Matthew Gale, No. 770). The operculum is a raised cone, bearing a series of ridges with a central circular gap.

× 4

The female lays a large number of eggs, sometimes as many as 10 per night in culture at about 75°F, less than half this number at room temperatures (60-70°F). It is likely that the number of eggs laid is large to counteract high predation in the natural environment. Egg hatch is often very high - about 90% - and usually takes place during the day.

Nymphs: The nymphs hatch in about 4 months from eggs kept almost dry at around 80°F; at room temperatures they take about 7 months to hatch. They can be sexed as soon as they hatch - females at 2.6 cm long overall are longer than males at 2.2 cm. However, Matthew can find no such length difference and sexes his first-instar nymphs from the males' sub-genital plate, which is quite visible as a "bump" on the eighth abdominal segment. In females, the beginning of a sub-genital operculum is visible on the seventh abdominal segment (although this is harder to see). In both sexes, it is easier to wait a couple of days for the nymphs to fill out before sexing them, as some have shrivelled abdominal tips on hatching.



x1·5

Both sexes have green patches on the legs, the body being brown. As the nymphs grow, they assume a variety of colours. They are sometimes gregarious and also sometimes feed during the day.

Defence: Adults of both sexes display their wings as flash colours, but this seems to be of little use in the female. They may drop off their foodplant and run away from danger quickly and are sometimes a problem to handle. The females emit a pungent smell, a bit like that of Extatosoma tiaratum; the males do so occasionally. It is said that the adults can bite. They may attempt this sometimes but cannot penetrate the skin.

Foodplants: The natural foodplant is guava; the insects seem to feed on small bushes but not the larger trees. In Europe some cultures will eat bramble, but the best food is wild rose or rambling rose. They will also eat holm oak, hawthorn, eucalyptus, raspberry, loganberry and fuchsia. Nymphs will often accept only rose to begin with, then eating other foodplants when they are older.

Comments: This is an interesting species to keep, but it has presented problems, mainly with nymphal mortality. A temperature of at least 75°F and high humidity are probably ideal, with a fairly large cage needed. Once the nymphs are past the first instar they are easy to rear and the adults are hardy and long lived. For no apparent reason, Matthew lost almost an entire culture by a form of creeping paralysis starting from the back legs and abdomen.

APLOPUS SP. (PSG 48) CULTURE DIFFERENCES by Michael and Frances (No. 3)

This species provides a very good example of differences which can arise between different cultures, perhaps increased because Miguel Adams' (ex No. 72) culture (see Newsletter 12, pages 3 and 4) was in Dominica, their natural home, and ours in London. Differences we found were: our adults covered a wider size range, tending to be smaller, particularly the males; we never found ours at the base of the foodplant; our females displayed their wings (not our males); and ours never bit. Another difference has arisen between English first- and second-generation cultures. Our first-generation nymphs would eat only rambling (wild) rose at first. So we warned everyone we gave eggs to accordingly, but several people have since told us that this warning was unnecessary, as their nymphs happily ate bramble immediately.

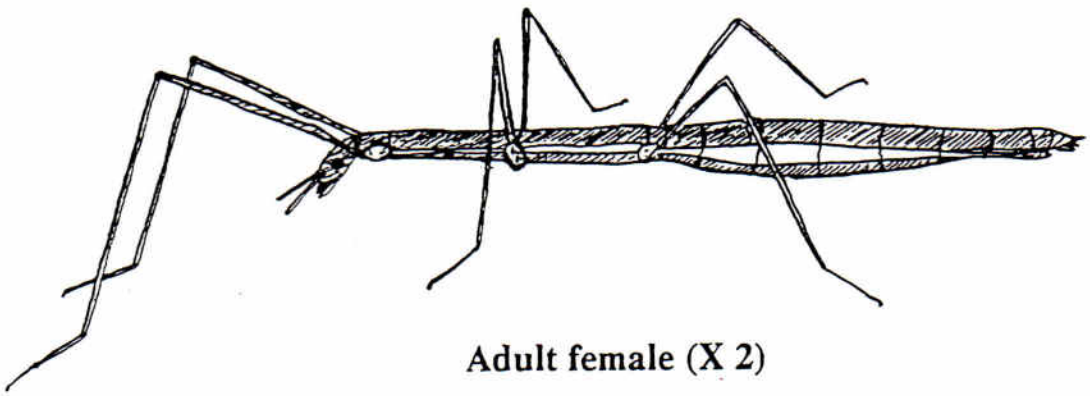
LEPTYNIA HISPANICA (BOLIVAR) by Philippe Lelong (No. 474)

Classification: This species was first described by Bolivar in 1878 - the genus was established in 1890 by Pantel. (The genus Leptynia, meaning "to get thinner" in Greek, is so named by reference to the spindly form of its representatives.) In the past this species was named Bacillus hispanicus (Bolivar and Brunner).

Range: L. hispanica lives in chalky Mediterranean scrubland (garrigues), its range in the South of France and in Spain being given by Brock (reference 1, pages 16-17).

This species lives essentially on low-growing plants, notably the natural foodplant Dorycnium suffruticosum (Vill.) (at the beginning of the century this peaflower was named Leptynia's grass by Pantel). It is also found on plants immediately nearby, and on wild rose (Rosa canina L.). This phasmid can often be found at the top of the foodplant in ditches at the side of small roads cutting across the scrubland. Its size, colour (identical to that of D. suffruticosum) and immobility, and its rarity combined with foodplant abundance, all make discovery of this phasmid difficult - it is also very localised. In nature adults can be found from the end of June to late August; hatching takes place in April.

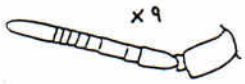
Culture history: The specimens of this study were found in the commune of Aumelas, beside road D139, on 3rd and 4th July 1989.



Adult female (X 2)

Adults: In France males are very rare and they are all, to my knowledge, gynandromorphic (abnormal females with the appearance of males but incapable of fertilising true females). Pantel stated in 1898 that "one would meet with difficulty one male per thousand females". According to Cappe de Baillon and de Vichet (1940), reproduction is exclusively parthenogenetic in France. Consequently this Report will deal almost entirely with females.

The female is small, the average body length being 50-52 mm, with a maximum width at the first few abdominal segments of 3-4 mm. The body has a cylindrical shape and its surface is without spines or roughness; it is apterous (wingless). In nature, and in culture, roughly one-third of specimens are greyish brown and two-thirds are pale green - some specimens have their last four abdominal segments completely black or dark brown. Each individual has a white line, about 1 mm wide, on each side and along the whole length of the body. The antennae are very short, measuring 3-3.5 mm in length - the segments are of uneven length (see drawing) and their colour is always brownish pink. The abdomen ends in a sharp point with small filiform cerci, and the last three dorsal segments form a rigid block, very compressed laterally, hiding practically all the ventral area. The lamina subgenitalis completely covers the genital valves (see drawing) and its edges are often pink. Further dimensions of this phasmid are given by Lelong (reference 4; page 19 of English version).

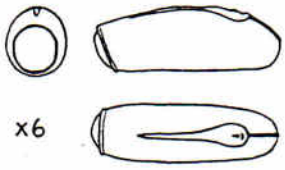


Reference 4 also gives the dimensions and a drawing of the adult male. He is shorter and thinner, but with longer legs, than the female.

Adult females in culture live about 5 months. This is longer than in the wild, where adults live 2 or 3 months, from the end of June to the end of August (sometimes to the end of September at the latest). It is difficult to know what causes this difference, because natural climatic conditions in autumn are not, apparently, unfavourable to this species, and foodplant is plentiful. The cause is perhaps the extreme dryness often present in this period in the regions concerned, or the decrease in the night-time temperature.

Parasitism: Females are often parasitised by a small fly, Thrixion halidayanum. After developing, the parasite leaves its host without causing more injury than a small haemorrhage, although it produces a general weakening, with reduced egg laying. The existence of the parasite is indicated by the presence of 1 mm black buttons on the side of the first few abdominal segments. Of 13 females captured, seven were more or less parasitised. One female died within 2 days; she carried seven scars left by parasites. For further details see references 5 and 8.

Ova: Eggs are sausage shaped with dimensions 4.1 mm long, 1.3 mm wide and 1.5 mm high. Their colour is brown and their surface is finely chiselled (but appearing almost smooth). The operculum is round and smooth, without a capitulum. The micropylar plate is very long and ends in a point near the operculum.



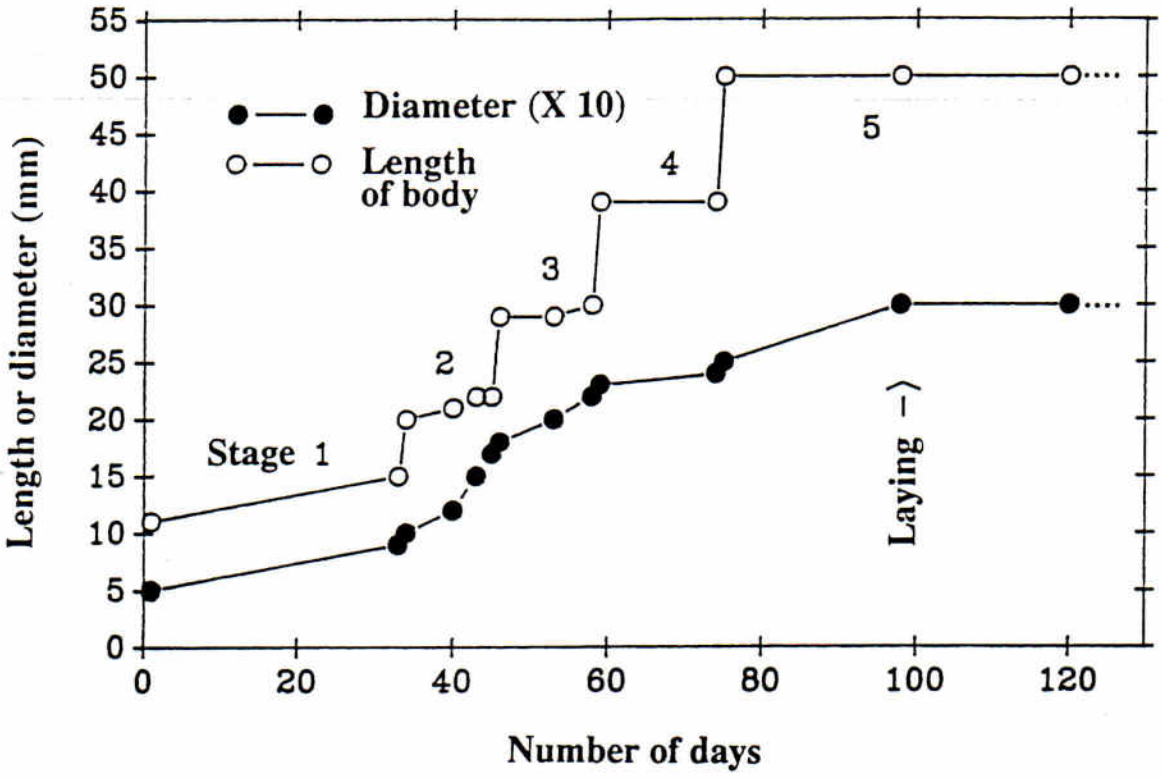
The female usually lays eggs in small groups of 3-6 under several millimetres of soil, after digging with the abdomen for more than a minute; less often they are glued to a support (twig, leaf, etc). They are always laid at night, starting 1 or 2 hours after sunset. The average daily egg-laying rate is 0.6 per female, the maximum reaching 3 per female. However, females do not lay regularly every day but only once every 2 or 4 days, followed by a pause. This phenomenon also occurs with Clonopsis gallica, but is then less pronounced (Voy, 1954).

Eggs of L. hispanica are fragile, so handling is very difficult. Every day eggs were separated from the soil with a simple sieve and immediately placed in a transparent plastic box containing a moist cotton-wool ball. It is very important not to wet the cotton-wool too much, because with too high humidity mould develops quickly and the eggs rapidly decay. The ideal situation is to let the cotton-wool dry between two additions of water, but with never more than 2 or 3 days of dryness. The incubation temperature was 23°C, near a window facing west and behind a curtain. Eggs of this species have no diapause, so you only have to wait patiently for hatching. After 3 months of incubation it is very easy to distinguish fertile eggs by candling, because they are dark rather than "clear".

Dark eggs have a hatching rate higher than 90% but the overall rate is 25%; however, 2.8% of nymphs are unable to emerge from the egg. The incubation period is about 6 months at 23°C. Apparently a high level of humidity is necessary for hatching: when the humidity decreases too much, the hatching rate rapidly falls to zero.

Nymphs: At birth, nymphs are 10 mm long and 0.5 mm wide. Their antennae are brownish pink and their bodies greyish green. They look very like young Bacillus rossius. From the third instar their white lines are easily visible and the nymphs have a characteristic shape, so identification is easy. On hatching, they are very active compared with adults, as they often walk around all day.

The diagram shows their growth at 23°C. Growth in length is very considerable during the first instar; the integument ("skin") is still supple and it is possible for the body to lengthen almost 40% without



moulting. After the first instar, this phenomenon becomes less and less important and growth becomes more dependent on moulting. On the other hand, the growth in diameter is practically continuous until the onset of egg laying, and independent of moulting. The growth through the five instars is rapid (100 days to become adult).

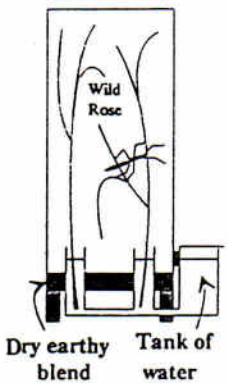
From the second or third instar the body colour can change to grey or brown (the antennae are always brownish pink).

The mortality during growth is low (19%); deaths mostly occur during moulting between the second and third instars. During the first instar, mortality is practically non-existent, and only a few specimens die at the start of the adult stage.

Foodplants: The foodplant for nymphs was Rosa sempervirens (L.). This species of wild rose was chosen because in winter it is the only species in the surroundings of Toulouse having leaves. For adults the foodplant was Rosa canina (L.) when possible, because this rose is more robust so greater quantities of foliage could be collected. From the first instar, nymphs accept different varieties of Helianthenum (Brock, 1989-90, private communication).

Defence: The only defence is camouflage.

Rearing: A cage suitable for nymphs or adults can be made with simple square cross-section (1 cm x 1 cm) wood and brown fibre-glass mosquito netting. The volume should be 1500 cm^3 per adult female. The bottom of the cage is covered with 1-2 cm of a dry blend composed of one-third limestone earth, one-third compost and one-third river sand. Foodplant stems dipped in water and a system for adding water to an external tank are incorporated to avoid opening the cage and disturbing the phasmids. The room temperature should be between 23 and 32°C. The humidity in the cage is low, about 50-60%; the humidity near the foodplant is more important. A light spraying with tap water every 3 or 4 days in the evening through the mosquito netting introduces drinking water; evaporation is complete in 3-4 hours. Contrary to the two other French species, L. hispanica appreciates water spraying.



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2. Cappe de Baillon, P., and de Vichet, G., La Parthénogénèse des espèces du genre Leptynia (Pant.), Bull. Biol. France et Belgique, 74 (1940) 43-87.
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5. Lelong, P., Thrixion halidayanum (Rond.), parasite de Leptynia hispanica (Bol.), OPIE Imago, 36, 20-22; or GEP Revue, 5 (1989) 19-22; summarised in English in PSG Newsletter, 41 (1989) 13.
6. Lelong, P., Biologie et élevage de Leptynia hispanica, GEP Le Monde des Phasmes, 8 (1990) 4-13). This French version of this Species Report contains more information on classification and dimensions, a map of the distribution of L. hispanica in France, as well as graphs showing the variations with time of the following: the number of eggs laid per female per day; the number of females surviving and the total number of eggs laid; and the numbers of hatchings and of deaths (per day and accumulated).
7. Pantel, J., Notes orthoptérologiques: II, Les phasmides d'Europe et de pays limitrophes, Anal. Soc. espanica Hist. Nat. 19 (47) (1890) 371-422.
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WANTS AND SURPLUSES

Daniel Isaac (No. 803) wants eggs of PSG 85.
Nicholas Wadham (No. 358) has surplus PSG 1, 5, 9, 13, 22, 23, 37, 40, 52 and 82.

NEXT SPECIES REPORT

Paraphasma rufipes (PSG 85)

We now have no more definite offers of Reports on species not already covered. So such Reports will have to be discontinued unless members are willing to contribute more - up to the usual standard (under the same headings), and preferably including drawings. Would any volunteers please write urgently to the Editors (address below) so that we can plan ahead.

SUBJECT INDEX (To Newsletters 38-45) - This is planned for the next Newsletter.

NEXT NEWSLETTER

Please send all other contributions to the Editors: Michael Lazenby and Frances Holloway, at 9 Oaklands Court, Nicoll Road, London NW10 9AU, to reach us by 1st February 1991, or preferably earlier. Up-to-the-minute items may be accepted up to 10th February.

All contributions to the Newsletter will be deemed to be submitted also to the French GEP Le Monde des Phasmes for translation.

Season's greetings to all our friends — Michael & Frances