Description of Brachypelma annitha n.sp. and Brachypelma hamorii n.sp. male and female, new species close to Brachypelma smithi (Cambridge, 1897) from Mexico. Study and taxonomic relationships of the two species and comparison with Brachypelma auratum (Schmidt, 1992), B. boehmei (Schmidt & Klass, 1993), B. emilia (White, 1856) (Araneae, Theraphosidae, Theraphosinae).

Part 2.

Marc TESMOINGT * Frederick CLETON & Jean-Michel VERDEZ

* 46 rue H. Ployard, 5Ô260 HELLEMMES

VI / DESCRIPTION OF THE MALE OF BRACHYPELMA annitha:

Colour:

The majority of the prosoma is brown/cream, only the cephalic (streaks) are blackish but with overflows up to the first radiant streak. For the ambulatory legs, orange areas are identical to that of the female, slightly brighter in the male. The orange cream areas of the tibiae of LIII and LIV are less dense in the male.

MORPHOLOGICAL DESCRIPTION:

Prosoma: 23 x 22 mm, as long as broad.
Body length: 50 mm, with a leg span of 150 to 155 mm.
Abdomen: 25 x 18 mm.
Eye area recurved, 2.1 x 1.6 mm (Pl.7, fig 2).
Anterior edge of eye fovea area: 12 mm.
Clypeus: 0.3/0.4 mm.
Chelicerae: 12 mm (extracted from the prosoma), 8 mm fixed.
The cheliceral teeth consist of 10 teeth including 2 of small size forming a length of about 5 mm.
They consist of: 2 large, 3 smaller, 3 medium and 2 small (see Pl.7, Fig 4).
Sternum: 9 mm, consisting of three pairs of sigillae whose orientations are identical to the female.
The LI sigilla is quite distant from the edge of the sternum (Pl.7, fig 3).
Ocular tubercle: 2.2 x 1.8 mm, as long as broad.
Distance between the two anterior edges of the ALE: 1.7 mm.
Distance from the posterior edge of ALE and anterior edge of the PLE: 0.4 mm.
Distance between the posterior edges of the PLE: 2.1 mm.
Difference between the AME: 0.6 mm.
Difference between the posterior edge of the AME and anterior edge of the PME: 0.2 mm.
Distance between the posterior edge of PME and the anterior edge of the PLE: 0.1 mm.
Distance between the posterior edge of ALE and the anterior border of AME: 0.3 mm.
Distance between the posterior edge of AME and the anterior edge of the PLE: 0.5 mm. (Pl.7, fig 5)

Tibial apophysis, copulatory apparatus:

The tibial apophysis (retrolateral) consists of two spurs of which one is smaller. The main spur is curved inward and slightly off center on the side. The ends of the two spurs are rounded. On the upper part of the main spur, stands a short spine of high density and triangular in shape. On the inside of the second and at its base, we can observe at least three spines of different size and shape, very close together, the largest of which is shaped like a "spear".

The copulatory apparatus is basic, it is composed of the pear-shaped bulb narrowing slightly up to the embolus, which consists of a bowl much larger than in *smithi*. It should be noted, that the bulb is straight while with *smithi* it is curved and tapers towards the embolus. (see Pl.8, fig 1-11).

Values of the sections of the legs:

	TRO	FEM	PAT	TIB	MET	TAR
LI	5	19	10	19	15	8
LII	5	16	9	13	15	8
LIII	5	15	10	13	15	8
LIV	5	18	10	15	20	8

Total length of the legs: LI: 76 mm, LII: 66 mm, LIII: 66 mm, LIV: 76 mm.
Pedipalps: TRO: 4 mm, FEM: 11 mm, PAT: 6 mm, TIB: 10 mm.
Relations between the sections and the length of the prosoma:
PAT LI + TIB LII and LIII. PAT LIV + TIB LII and LIII. FEM LIV + TRO LI to LIV.
MET LI to LIV to + TAR LI to LIV.
Scopula: LI: 3/4, LII: More than 2/3, LIII: 4/5, LIV: 2/3.

VII / VISUAL DESCRIPTION OF MALE Brachypelma hamorii:
[The male had been in alcohol for some time so the colours have faded].

Dorsal side:
Chelicerae: cream hair, brown on the lateral sides, central part with gray hairs. Prosoma is black, anterior part (eye area) with cream seriate hairs. Peripheral band widening towards the posterior part, brown drawing around orange. Legs: femora and trochanters black. Patella with two orange bands separated by black hairs (denser than in *smithi*, the female as well) and bordered at the intersections of the tibiae with cream hair. Tibia black (3/4) with, at the intersections of the metatarsals, brown orange hairs (LI, LII), LIII and LIV being lighter. Metatarsus black with a band of brown orange hair at the base. Tarsi black. The hairs are much denser on the LIII, LIV starting from the patellae. Pedipalps the same. Note that the orange areas of the patellae are more vivid on the LI and LII, The abdomen is black with orange hairs.

Ventral side:
Labium, coxae of the pedipalps reddish. All parts of the body are dark brown with orange hairs (colour no doubt due to discolouration occurred during its extended stay in alcohol).

MORPHOLOGICAL DESCRIPTION OF THE MALE OF BRACHYPELMA hamorii

Body length: 47 mm, with a leg span of 145 mm.
Prosoma: 21 x 19 mm (for contrast, see figure).
Abdomen: 19 x 14 mm.
Ocular tubercle: longer than wide 2.3 x 1.6 mm. (Pl 9, fig 1-2)
BP AOX FOV: 11 mm.
Clypeus: 0.3 mm.
Spinnerets: primary 9 mm, secondary 2 mm.

Values of the eyes of the ocular tubercle:

Diameter of the eyes: AME: 0.4 mm, PME: 0.4 x 0.2 mm, ALE: 0.5 mm, PLE: 0.5 mm.
Distance between the anterior edges of the ALE: 1.6 mm. Posterior edges of the PLE: ditto.
Posterior edge of the ALE and anterior edge of the PLE: 0.3 mm.
Difference between the AME (center to center): 0.8 mm.
Difference between the AME (edge to edge): 0.4 mm.
Distance between the PME: 1.1 mm.
Difference between the posterior edge of the PLE and anterior edge of the AME: 0.2 mm.
Distance between the posterior edge of the ALE and the anterior edge of the PME: 0.4 mm.
Distance between the posterior edge of the ALE and the anterior edge of the PLE (diagonal): 1.7 mm.
Difference between the posterior edge of the AME and the anterior edge of the PLE: 0.5 - 0.6 mm.
Difference between the posterior edge of the AME and the anterior edge of the PME: 0.1 mm.
Difference between the posterior edge of the PME and the anterior edge of the PLE: less than 0.1mm (about 0.06 mm) (see plate 9, fig 11).
Coxae of the pedipalps (see plate 9, fig 10).
Chelicerae 8 mm. The cheliceral teeth consist of 11 teeth, 4 large, 4 medium and 2 small, including two very tapered and 2 with a rounded tip. Length of the teeth 5 mm (Pl.9, Fig. 3).
Sternum longer than wide, more elongated than in *smithi*. 19 x 7 mm. It is composed of three pairs of ovoid sigillae LI, LII almost the same size. Note that the sigillae of the LII are directed toward the posterior edge of the sternum, whereas the LIII are to the anterior edge which is in contrast to *smithi* whose sigillae are all oriented towards the anterior edge of the sternum. (Pl.9, Fig 4). Labium: round towards the base. (Pl.9, Fig 6). Scopula: LI: entire, LII: 3/4, LIII: 2/3, LIV: 1/2.
Spines of the legs: LIII: base of the tibia 2 spines, metatarsus: 3 spines including 2 basal spines with one prolateral and 2 medial in parallel. LII: base of the tibiae, 2 spines (ditto for LIV). Metatarsus, 3 spines including 2 basal and one in the middle near the lateral side. LIV: metatarsus, 11 spines, 2 basal close to the lateral side, 2 in parallel offset, 1 inclined backwards toward the edge laterally (all three in the scopula), and 6, including one close to the TIB MET intersection, 3 in line inclined towards the lateral edge and 2 staggered and tilted toward the opposite lateral edges there is no spine as with *smithi* on the tibiae of the pedipalps, except at the intersection of the tarsus. (Pl.9, Fig 7, 8, 9).

Values of the sections of the legs:
Prosoma: 21 x 19 mm.

	COX	TRO	FEM	PAT	TIB	MET	TAR
LI	10	3	16	9	13	13	9
LII	8	2	15	9	12	13	9
LIII	8	2	13	8	11	14	8
LIV	8	2	16	9	13	17	9

Total length of the legs: LI: 73 mm, LII: 68 mm, LIII: 64 mm, LIV: 74 mm. Pedipalps: COX: 7 mm, TRO: 2 mm, FEM: 11 mm, PAT: 6 mm, TIB: 10 mm, TAR: 4mm
Total length: 40 mm.
Relations between the values of the leg sections and the length of the prosoma:
PAT LI (LII, LIV) + TIB LII. FEM LIII + PAT LIII, TIB LI (LIV) + PAT LIII.
TIB LIV + PAT LIII.
MET LI (LII) + PAT LIII.

Tibial apophysis, copulatory organ:

Whereas in *B. annitha*, differences between the tibial apophysis and copulatory organ are distinct from *B. smithi*, in *B. hamorii* aside from a few small details, they are similar in many ways (is it a subspecies?). In *B. smithi*, the arc joining the spurs is rounded at the base (Pl.11), in *B. hamorii*, it seems that it is less so and more widened. In the 2 species, the terminal portion of the spurs is irregular (granules): the two main spurs are identical, the secondaries less so: in *smithi*, they are fairly widened to the base and in *hamorii* narrower. Presence of two strong "spearhead" spines in the terminal portion of the main spur and in the opposite position (the 2 varieties). The shape of the spines are different, the locations also. The largest of the spines of the primary spur of *smithi* is further from the end part than *hamorii* which, in the latter exceeds it. On the secondary spurs, the opposite is true: that in *smithi* it exceeds the terminal part, were as that of *hamorii* is set further back. Aside from these details, no precise criteria differ in absolute terms.
The shape of the bulbs are fairly close, the embolus has some differences that are not really of notable contrast to morphologic characters of the two males. This is a matter of discussion (see Pl.9 and 10).

VIII / RESULTS AND DISCUSSION:

This work shows than both specimens although visually similar to *smithi*, are two different species. Already the physical colours as well as the contrasts of the prosoma are different, the hair is denser for *annitha* (PII, PIV), the patella red with *hamorii*. The clypeus and the cheliceral teeth differ, as well as the labium and the labio-sternum. With regard to the ocular tubercle and size of the eyes as well as their arrangement there are significant differences in particular the size of the PLE in *hamorii* with regard to the other eyes. In *B. smithi*, the ALE are larger than the PLE (in *annitha* as well). The spines of the tibia of the pedipalps, with *hamorii* on the moults and dead bodies examined, there shall be a series of 3 spines basally, whereas there are 8, including 4 basally in *annitha*. In males, the differences are equally observable. However, it is remarkable to note that if the spermathecae of *annitha* are more or less close to *smithi*, in contrast the copulatory organs of the males are unique and important differences exist with those of the male of the latter such as the tibial apophysis. Conversely and more interesting, if the spermathecae of *hamorii* are specific, the tibial apophysis and bulbs are however similar to those of *smithi*, while morphological differences do exist between both, the question is: are these two species merely subspecies of *smithi*? The question remains, at least for *hamorii* because *B. annitha* refused both male and female copulation with *smithi* and any attempt has resulted in failure among many breeders. This shows than *B. annitha* is a real species.
A revision of the genus *Brachypelma* becomes indispensable and the rehabilitation of the genus of *Brachypelmides* is required. It will take into account a lot more elements and more importantly, in order to avoid any controversy by ensuring use of micro-pictures of the reality of the descriptions. In addition, it should work on many more specimens of each species in order to have a pool of usable data, which is not always evident. Therefore, we believe it is important that we work together with our colleagues in Europe (German and English in particular).
The sketches and plates are comparative for that followed by some of the micro photographic plates on all the items mentioned in this work. The macro photos by F. Cleton show the variations of colours and contrasts. It is certain there are other "*smithi*". Caution should therefore be the rule because it is well understood that crosses carried out with these close varieties would complicate

identifications and future classifications. This of course is not true for successful reproduction in all Theraphosidae.

CREDITS:
We extend our warmest thanks to Dr. Marie-Louise Celerier for the high-quality material that she provided us, we are also indebted to her for sharing her knowledge and without whom this work would not have been created.
We also thank Mr. Jean-Pierre Gazet, a very old friend and collaborator, for the small very useful equipment he sent us.

BIBLIOGRAPHY:

- A. SMITH: Tarantula spiders, Tarantulas of the USA and Mexico. Fitzerald Publishing - London ISBN 09510939 9 -1, 158-176 - 1994.
- A. SMITH: The tarantula classification and identification guide. Fitzerald Publishing - London 41-51. 1986.
- A. SMITH: Brit. Taran. Soc. (8) 4, p14, 1993
- AUSSENER: Verh. Zool. Bot. Ges Wien - 25, 197. 1875
- O.P. CAMBRIDGE: Biologie Central Amer vol 2, 20; 1897
- G. SCHMIDT: Vogelspinnen, 4ème Edition. Landbuch-Verlag GmbH, Hannover, 69-65, 1993.
- G. SCHMIDT: B. auratum, Arachnologischer Anzeiger. 8-9, 1992.
- G. SCHMIDT, KRAUSE: B. baumgerteni. Studies. Neotrop- Fauna. Environ, Vol. 29 N°1, 7-10, 1994.
- WHITE: Proc. Zool. Soc. London, No.24, 185, 1856.
- R. J. RAVEN: The spider infraorder Mygalomorphae (Aranea): Cladistics and systematics, Bull, of the American museum of natural history. Vol 182, art.. New York, 1985.
- M. TESMOINGT: Mise en évidence de certains caractères biomorphologiques de Latrodectus hasseltii (THORELL, 1870), (Araneae, Theridiidae). Arachnides No.31, p18.

Plate 7. Male of *Brachypelma annitha*
1.Prosoma: contrast 2.Ocular tubercle 3.Sigillae 4.Cheliceral teeth 5.Metric eye measurements 6.Labium 7.Labio-sternum 8.Coxa of the pedipalps 9.Metatarsus of Leg IV

Plate 8. Tibial apophysis, bulb and embolus of *Brachypelma annitha*
1.Bulb 2.Tibial apophysis 3.Bulb 4.Embolus 4a.Embolus 5.Appearance of the spurs 6.Spine on primary spur 7.Secondary spur 8.Spines of the secondary spur 9.Close up of the spine 10.Position of the spines on the secondary spur 11.Close up of the spines

Plate 9. Male of *Brachypelma hamorii*
1.Ocular tubercle 2.Prosoma: contrast 3.Cheliceral teeth 4.Sigillae 5.Fovea 6.Labium 7.Metatarsus of leg II 8.Metatarsus of leg III 9.Metatarsus of leg IV 10.Coxa of the pedipalps 11.Metric eye measurements

Plate 10.
1.Bulb of *B. smithi* 2.Shape of the bowl and embolus 3.Bulb: other view 4.Bulb of *Brachypelma hamorii* 5.Embolus 6.Embolus

Plate 11. Spurs of the tibial apophysis
Brachypelma smithi: 1.Complete view 2.Spines on the primary spur 3.Spines on the secondary spur *B. hamorii*: 4.Close up of the spine 5.General view 6.Primary spur 7.Secondary spur *B. annitha*: 8. General view 9.Primary spur 10.Close up of the spine 11. Secondary spur

PLANCHE 7

MALE de *BRACHYPELMA annitha*

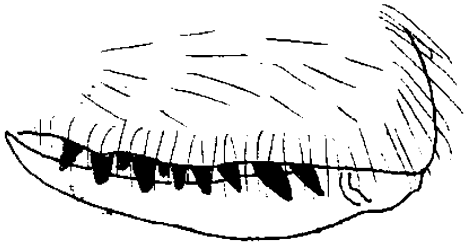
prosoma, contraste 1

♂

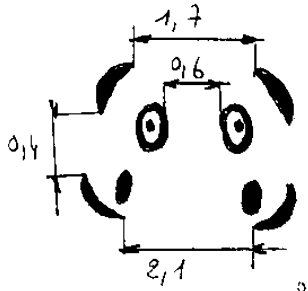
2 aspect aire oculaire

3 sigilles

4 rateau des chélicères

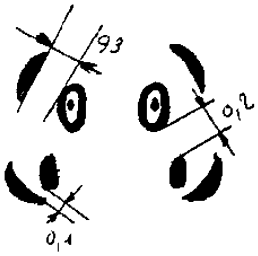


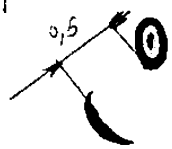
5 aire oculaire partie métrique



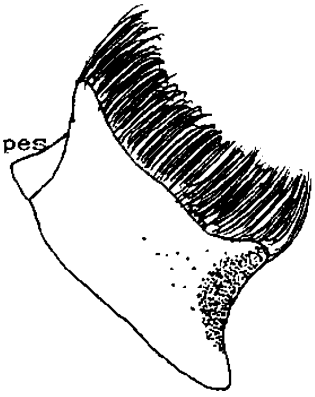
6 labium

7 labio sternum





Coxa des pédipalpes 8



MET PIV 9

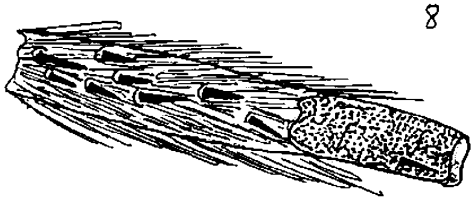


PLANCHE 8

TIBIA APOPHYSE, BULBE et EMBOLUS de *BRACHYPELMA annitha*

FIG 1 BULB

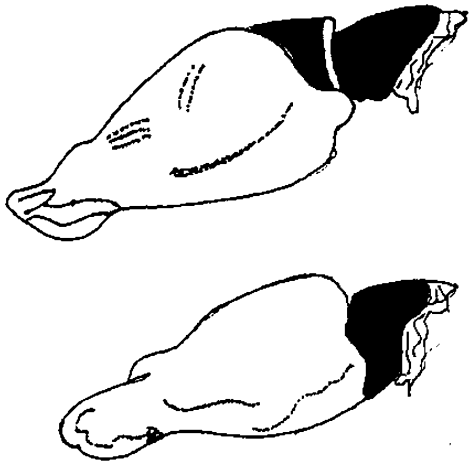
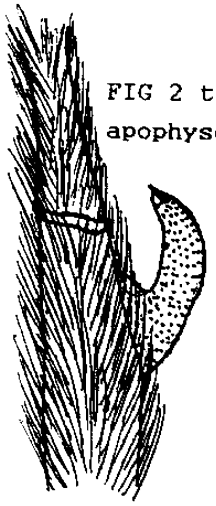
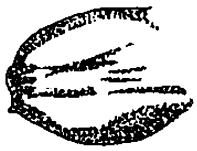


FIG 2 tibia apophyse

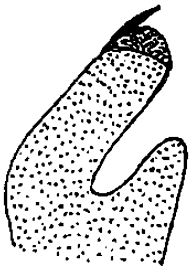


G 3 BULBE



4 Embolus

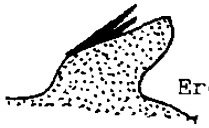
4a embolus



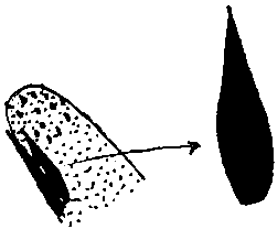
epine ergot principal

FIG 6

FIG 5 aspect des ergots



Ergot secondaire 7



gros plan de l'epine 9

epines de l'ergot secondaire 8

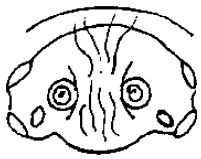
10 11

position des epines sur l'ergot secondaire

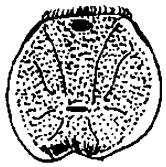
PLANCHE 9

MALE de *BRACHYPELMA hamorii*

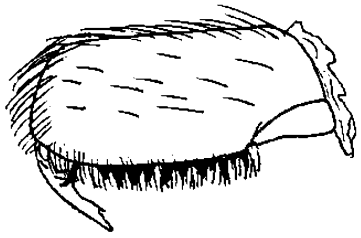
1 aire oculaire



2 prosoma: contraste

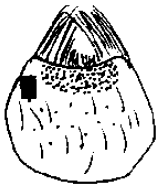


3 rateau des chélicères



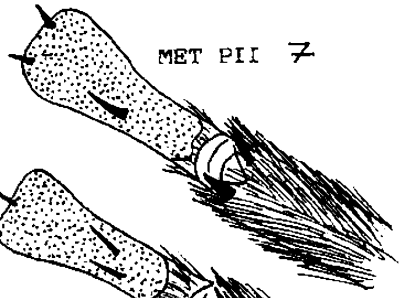
4 sigilles

5 Fovea

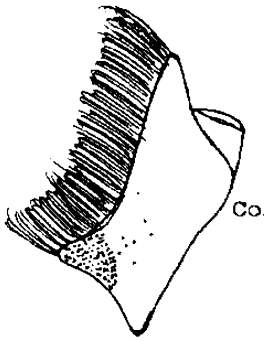


6 labium

MET PII 7

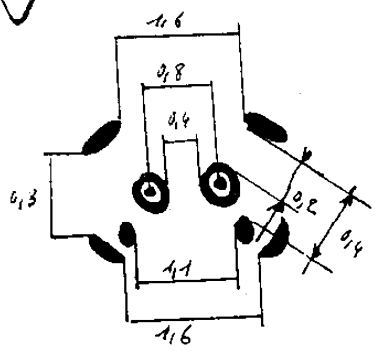


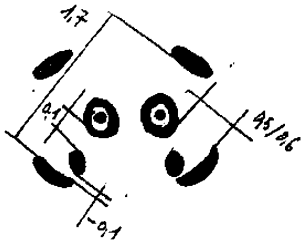
MET PIII 8



Coxa des pédipalpes 10

MET PIV 9



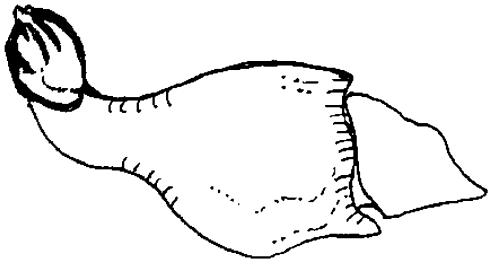


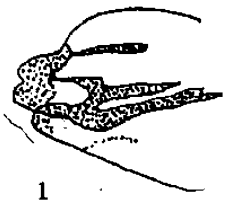
11 aire oculaire partie métrique

PLANCHE 10

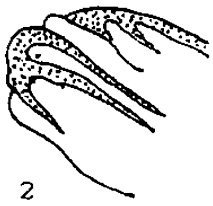
2 forme de la cuvette et embolus

1 BULBE B.smithi



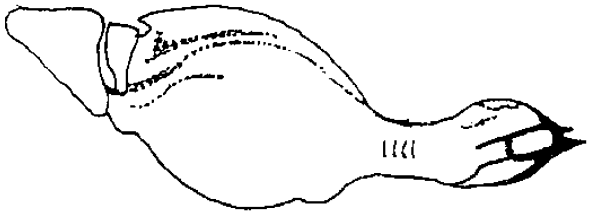


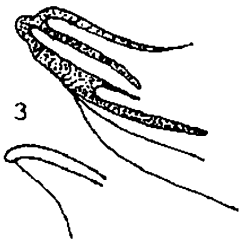
1



2

3 B;smithi: autre vue

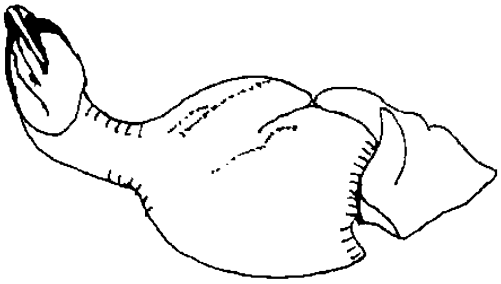




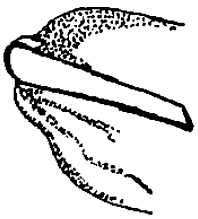
3

embolus

4 BULBE DE BRACHYPELMA hamorii



5 embolus

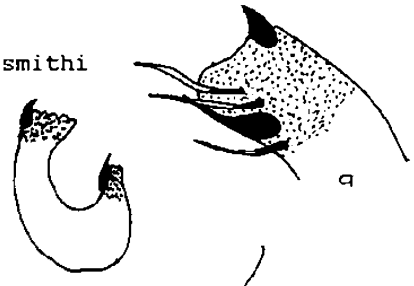


embolus 6

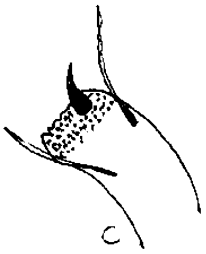
PLANCHE 11

ERGOTS des TIBIAS APOPHYSES

Brachypelma smithi

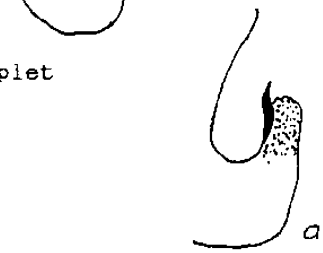


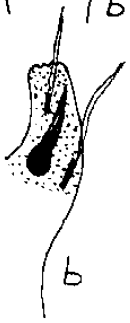
2 épines sur l'ergot principal



a b c

1 complet





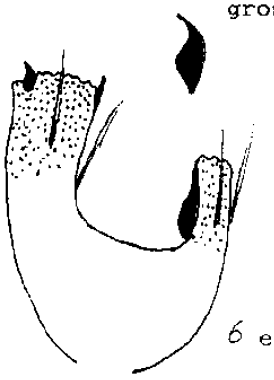
a b

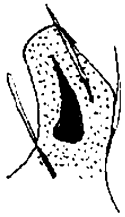
3 épines sur l'ergot secondaire

gros plan de l'épine 4

B. hamorii

vue générale 5

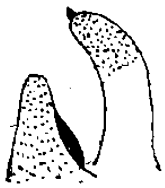


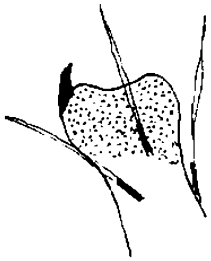


6 ergot principal

7 ergot secondaire

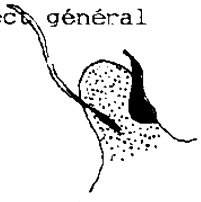
Brachypelma annitha





gros plan de l'épine 10

8 aspect général



9 ergot principal

11 ergot secondaire