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## BRAZILIAN PALEOZOIC BLATTOIDS: REVISION AND NEW SPECIES

Irajá Damiani Pinto  
Ivone Purper

### SINOPSE

Através do reestudo de tres blatídeos previamente descritos de Teixeira Soares, Estado do Paraná, Brasil, são apresentados novos detalhes sobre os mesmos, e descritas duas novas espécies da mesma localidade: *Phyloblatta paranaensis* Pinto et Purper sp.nov. e *P. sommeri* Pinto et Purper sp.nov. É atribuída a idade carbonífera superior para estes insetos.

### ABSTRACT

Through the restudy of the three previously known blattoids from Teixeira Soares, Parana State, Brazil, new data about them have been reported as well as about two new species found there: *Phyloblatta paranaensis* Pinto et Purper, sp.nov. and *P. sommeri* Pinto et Purper sp.nov. It is attributed an Upper Carboniferous age to such insects.

### INTRODUCTION

By checking the holotypes of the three described blattoids from the Brazilian Paleozoic and using both sides of the impressions, the authors found, in some cases, further details than those presented by the former authors. These data and others about the stratigraphy have led to compare them with european and asiatic species so as to achieve better knowledge of these species and also better understanding of the age. Meanwhile other specimens from the same locality have been described as new species.

### ACKNOWLEDGMENTS

The authors are thankful to Dr. Friederich Wilhelm Sommer of the Departamento Nacional da Produção Mineral, to Dr. Sergio Mezzalana (IGG - São Paulo), to Prof. Dr. Mario Hünicken (Universidad Nacional de Córdoba - Mendoza - Argentina), to Prof. Dr. Oscar Rosler (Universidade de São Paulo) and to Geol. Sergio Onzi that have furnished the fossil insects presently under studies. To Conselho Nacional de Desenvolvimento Científico e Tecnológico do Brasil (CNPq), to Fundação de Amparo a Pesquisa do Estado do Rio Grande do Sul (FAPERGS) and to Câmara Especial de Pesquisa e Pós-Graduação da Universidade Federal do Rio Grande do Sul (UFRGS) many thanks also for the continuous help to their researches.

### REPOSITORY

The material has been deposited in: DGM (Divisão de Geologia e Mineralogia; I.G., Univ. São Paulo (Instituto de Geociências da Universidade de São Paulo); DNPM (Departamento Nacional da Produção Mineral); UFRGS, MP-I (Universidade Federal do Rio Grande do Sul, Museu de Paleontologia, Invertebrados).

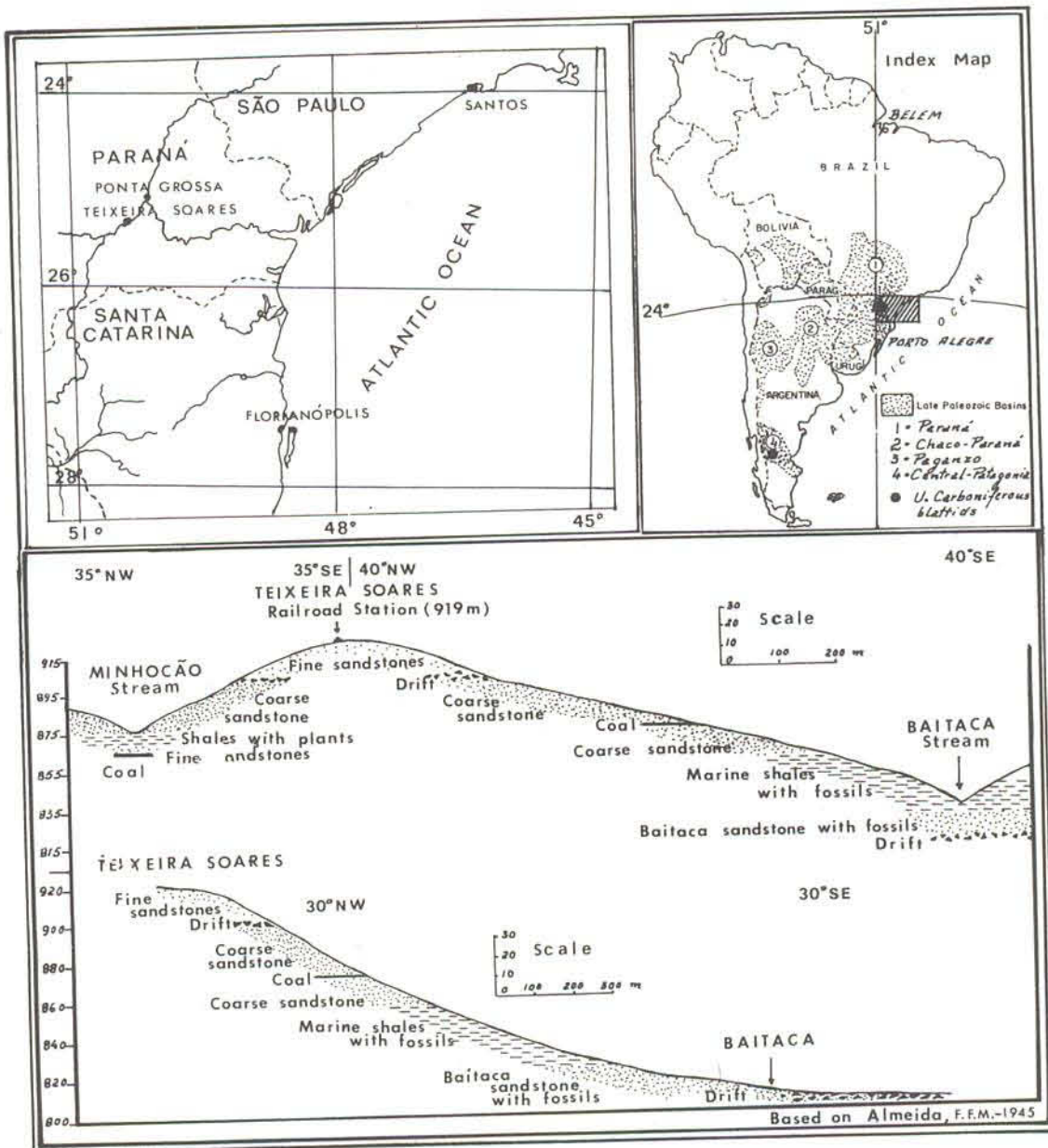
\* Professores do Departamento de Paleontologia e Estratigrafia do Instituto de Geociências da UFRGS. Trabalho recebido para publicação em 02/10/78.

## GEOGRAPHICAL, STRATIGRAPHICAL POSITION AND AGE

All the three paleozoic blattoid species described: *Phyloblatta oliveirai* Carpenter 1930, *P. roxoi* Petri, 1945 and *P. pauloi* Mezzalira, 1948, have been found at the locality of Teixeira Soares, Parana State (Fig. 1). Their stratigraphical position corresponds to Teixeira Soares Formation, Itararé Sub-group. That Formation has been attributed to a Carboniferous age by some authors, a Permo-carboniferous by others and a Permian age by some others. Really, for long time no body has ever tried to establish, based on a group of fossils, the precise age. To the first insect described as *Phyloblatta oliveirai* Carpenter, 1930, was attributed a Permian age by Carpenter (op.cit) because "Regarding the exact age of this fossil insect and the conditions under which it existed, little can be said at present. The investigations which Dr. Oliveira and Dr. White are carrying out on the geology and flora of the formation are still unpublished but Dr. White tells me that his studies indicate that the strata are of Lower Permian age". The other authors just followed Carpenter's view though at that time no fossil revealed the precise age and no comparative study of the insects to check whether they might put some light on it has been made. Daemon & Quadros (1970) doing palynological studies attributed to the lower part of the Itararé subgroup a Carboniferous age (Stephanian) and Pinto (1972) also based on insects reached the same result. The revision of the blattoids from Teixeira Soares Formation that are in the base of Itararé Formation shows the following:

*Phyloblatta oliveirai* Carpenter, 1930, *P. roxoi* Petri, 1945 and *P. langei* sp.nov. show close similarity to *P. tomiensis* Becker-Migdisova, 1961 from the Lower Balachonian of the Kuznetz Basin. *Phyloblatta pauloi* Mezzalira, 1948 shows close similarity to *P. alykaeensis* Becker-Migdisova, 1961 from Lower Balachonian of the Kuznetz Basin and also to *P. undata* Laurentiaux, 1950 from Commeny (Allier), Stephanian, France; *Phyloblatta sommeri* sp.nov. shows close similarity to *P. indecisa* Cockerell, 1927 from Upper Allegheny, Pennsylvanian, USA.

All those similarities, the palynological results and the fact that at Boituva, São Paulo at the same stratigraphical position typical Carboniferous insects have been found led the authors to attribute an Upper Carboniferous age for those insects too.







## SYSTEMATICS

Classis	Insecta
Infra classis	Neoptera
Super Ordo	Blattopteroidea
Ordo	Blattoidea
Familia	Archimilacridae
Genus	<b>Phyloblatta</b> Handlirsch, 1906

**Generic diagnosis:** "more or less regular elliptical front wings, whose length is at least  $2\frac{1}{4}$  times, but mainly  $2\frac{1}{2}$  times as great as the breadth. The costal area is always band shaped, never especially wide, and also never particularly expanded at the base; it extends at least one-half, but chiefly three-fifths or two-thirds the length of the wing and contains a variously large number of veins. The radius always remains in the anterior half of the wing and occupies, with its forward-directed branches, the free portion of the front margin. The first of these veins is either simple or furcate or is divide into 3 to 5 twigs. The media stretches in a gentle curve to the lower end of the apical border or to the extremity of the posterior border and sends off forward a variously large number of more or less compound branches, mainly rather straight to the apical margin, which they almost entirely occupy. The cubitus, with its chiefly compound veinlets, takes up nearly the entire free inner border, and with its distal branches frequently reaches even to the lower end of the apical margin. The anal area extends one-third to two-fifths the length of the wing and contains a moderately large number of veins. The intercalary venation is either more rugosely leathery or more cross wrinkled (?) Regular cross lines do not seem to be developed."

**Phyloblatta oliveirai** Carpenter, 1930  
Pl.1, fig. 1; Pl.2, photo 1

**Derivatio nominis:** in honour of Dr.  
Euzebio de Oliveira

**Holotypus:** An incomplete wing  
DGM-389-I

**Plastotype:** M.P., UFRGS n<sup>o</sup>  
MP-I-6182

**Locus typicus:** Teixeira Soares, Parana  
State, Brazil.

**Stratum typicum:** Teixeira Soares Fm.,  
Itarare Sub-group, Upper Carboniferous.

**Diagnosis:** "Based upon a fore wing, the anal area and apex of the wing missing. Length of fragment, 27 mm; greatest width, 13 mm. Anterior margin arched, strongly so at the base; Sc well developed, giving off over ten long and oblique veinlets to the anterior margin; radius remote from the subcosta, Rs originating well before the termination of Sc; the media divides a little distally of the origin of Rs; the cubitus sends six straight branches to the posterior margin before it forks".

**Description:** An incomplete forewing, having the anal area and the apex missing. Anterior margin strongly curved at the base. Sc parallel to the margin forming a narrow costal area, with over ten oblique veinlets, two of them bifurcate, one basally and other distally. R running parallel to Sc and sending off three branches the anterior one forks twice. Rs originate much before middle length and sends off at least two branches forward. M dividing a little after the origin of Rs and send off at least three branches backward, the first one branched. CuA curved backward sends off six simple straight branches to the posterior margin before it forks; the anterior branch forks once, the posterior branch send off forward two branchlets parallel to the main branch of CuA. CuP strongly curved at the base ends at the level of the origin of Rs.

**Remarks:** Carpenter did not make any comparison between *P.oliveirai* and similar species. The present authors trying to establish the correct age of this insect compared it with similar species. They found that it is quite similar to *Phyloblatta tomiensis* Becker-Migdisova, 1961 (p.121, fig.60) from the Lower Balachonian, Upper Carboniferous, of the Kuznetz Basin, URSS. However it differs in several details. It differs by having: a narrow subcostal area whereas *P.tomiensis* has an enlarged subcostal area due to the strong forward curvature of Sc before the origin of Rs; Rs originating more basally. In *P.tomiensis* CuA has only three branches before it forks and the last one bifurcates; in posterior branch of the fork sends off the branch-lets backward.

**Collector:** Euzebio de Oliveira

**Occurrence:** In a ravine east of Teixeira Soares, 45 meters below the yellow sandstone with pebbles, which at that place contain a thin bed of fossil plant.

***Phyloblatta roxoi*** Petri, 1945 emended Pinto et Purper  
Pl.1, fig.2; Pl.2, photo 2

**Derivatio nominis:** in honour of Dr.  
Mathias Gonçalves de Oliveira Roxo,  
S.G.B.

**Holotypus:** one incomplete forewing  
I.G. Univ. São Paulo n<sup>o</sup> 205

**Plastotype:** M.P., UFRGS n<sup>o</sup> MP-I-6186

**Locus typicus:** 1 km E of Teixeira Soares  
railroad station

**Stratum typicum:** Teixeira Soares Fm.,  
Itarare Sub-group, Upper Carboniferous,  
Brazil.

**Diagnosis:** A forewing fragment 33 mm long and 13 mm of greatest width. Anterior margin slightly arched distally. Sc almost straight reaching the anterior margin at 3/4 of the wing length and forming a narrow band. Rs originates just before 1/2 of the length. M divides a little before the origin of Rs. CuA apparently with two oblique bifurcate branches.

**Description:** The fragment lacks part of the basal and the postero-basal part. The anterior margin is almost straight and the apical margin broadly curved; posterior margin destroyed. Sc near and parallel to C showing at least seven oblique veins to the anterior margin some of them bifurcate. R forks distally in three branches. Rs originates just before the middle length and forks just after the bifurcation of the anterior branch of M. Each branch forks again forming seven branches directed to the apical margin. M dividing before the origin of Rs. The anterior branch forks before the bifurcation of Rs forming five branches. The posterior branch is single. The base of CuA is destroyed; about seven branches of it reaching the base of the apical margin.

**Remarks:** By getting some better data on the specimen it was possible to redescribe and compare with other specimens found at the same strata. It differs from *P.oliveirai* by having M dividing before the origin of Rs and the posterior branch being single.

**Collector:** Josué Camargo Mendes – 1944

**Occurrence:** At about 1 km from Teixeira Soares railroad station, Município de Teixeira Soares, Paraná State, in dark-gray shale associated with marine fossils such as *Orbiculoidea*, *Chonetes*, *Leda* and *Langella* (Fig. 1).



*Phyloblatta pauloi* Mezzalira, 1948 emended Pinto et Purper  
Pl.1, fig.3; Pl.2, photo 3

**Derivatio nominis:** in honour of Dr. Paulo E. de Oliveira  
**Holotypus:** one incomplete wing  
DNPM n<sup>o</sup> 3911-I  
**Plastotype:** M.P., UFRGS n<sup>o</sup> MP-I-6183  
**Locus typicus:** Teixeira Soares, Parana State, Brazil  
**Stratum typicum:** Teixeira Soares Fm., Itarare Sub-group, Upper Carboniferous, Brazil.

**Diagnosis:** Preserved wing 22 mm long and 12 mm wide; R with three branches; R and M parallel and almost horizontal; Rs sending five branches anteriorly and M four branches posteriorly; R and M having their branches parallel and directed toward the apical margin.

**Description:** Tegmen with the basal and apical part destroyed, the preserved portion 22 mm long and 11 mm wide; inferred length 32 mm; anterior margin and posterior margin slightly curved and almost parallel. Sc ends at almost the level of the third bifurcation of Rs; R forks before the forking of M and forks twice; Rs straight horizontal directed toward the apical margin sending five branches anteriorly; the first bifurcated distally, the second forks three times; the third forks very distally and the fourth and fifth are simple. M parallel to Rs sending posteriorly four branches directed toward the apical margin; the first branch originated at the level of the first branch of Rs and sending off three branches; the second bifurcates at the level of the third branch of Rs; the third and fourth branches are simple. All these branches are parallel. CuA is pectineforme and ends at about 7/8 of the length of the posterior margin; some of the branches of CuA are destroyed likewise the anal part.

**Remarks:** The reconstruction was based on the two sides of the impression, which permitted to get more details of the wing. It is very similar to *Phyloblatta alykaeensis* Becker-Migdisova, 1961 (p.111, fig.50) from the Lower Balachonian (Upper Carboniferous) of the Kuznetz Basin, USSR. It differs from that species by having: only three branches in R<sub>1</sub>; one more branch in Rs and with few and simple branches in M.

**Collector:** Sergio Mezzalira and Paulo E. de Oliveira — 1944

**Occurrence:** East side of Teixeira Soares, 1 km from the railroad Station, Município de Teixeira Soares, Parana State.

*Phyloblatta langei* Pinto et Purper sp.nov.  
Pl.1, fig.4; Pl.2, photo 4

**Derivatio nominis:** in honour to Dr. Frederico Waldemar Lange, a distinguished paleontologist from Parana State.  
**Holotypus:** An incomplete wing  
DNPM n<sup>o</sup> 2981-I  
**Plastotype:** M.P., UFRGS n<sup>o</sup> MP-I-6184  
**Locus typicus:** Teixeira Soares, Parana State, Brazil  
**Stratum typicum:** Teixeira Soares Fm., Itarare Sub-group, Upper Carboniferous.



**Diagnosis:** A forewing fragment 18 mm long and 10 mm as the greatest width; anterior margin slightly convex. Sc almost straight and regularly parallel to the anterior margin forming with it a narrow band until 1/3 of the length, enlarging apically; Rs originated about 1/3 of the length; M dividing at the same level of the origin of Rs; CuA sends off six straight branches to the posterior margin before it forks.

**Description:** A forewing where the anal area is missing. Length of fragment 18 mm, greatest width 10 mm. Anterior margin slightly convex. Sc almost straight and parallel to the anterior margin forming with it a narrow band until 1/3 of the length enlarging from this point to the apical margin. It gives off over thirteen long and oblique veins to the anterior margin at middle length two of them are bifurcate; R forks a little after the origin of Rs and send six branches toward to the apical margin; Rs originating before the termination of Sc and bifurcating at the level of the termination of Sc. M dividing just at the origin of Rs, the anterior almost horizontal branch directed to the apical border sending off two branches; the oblique posterior branch sends off four horizontal branches. CuA sends six straight simple branches to the posterior margin before forking, the posterior parallel to it and sending over four branchlets to the posterior margin. CuP broken, the base forming a broad curve.

**Remarks:** It presents some similarity with *P. oliveirai* but differs from it by having Sc forming an angle forward; one branch more in R; Rs originating at the same level of the bifurcation of M and the presence of cross veins and archidictyon, few cross-veins specially between R and M; archidictyon, hardly seen, formed by irregular fine network (Pl.2, fig6). It is similar to *Phyloblatta tomiensis* Becker-Migdisova, 1961 (p.121, fig.60) from the Lower Balachonian, Upper Carboniferous of the Kuznetz Basin, but differs in some details but specially from having the origin of Rs more distally and at the same level of the bifurcation of M.

**Collector:** Mathias G. de Oliveira Roxo – 1911

**Occurrence:** Teixeira Soares, Município de Teixeira Soares, Paraná

*Phyloblatta sommeri* Pinto et Purper sp.nov.,  
Pl.1, fig.5; Pl.2, photo 5

**Derivatio nominis:** in honour of Prof.  
Dr. Friederick Wilhelm Sommer, DNPM,  
Rio

**Holotypus:** one incomplete tegmina  
DNPM n<sup>o</sup> 2982-I

**Plastotype:** M.P., UFRGS n<sup>o</sup> MP-I-6185

**Locus typicus:** Teixeira Soares, Parana  
State, Brazil

**Stratum typicum:** Teixeira Soares Fm.,  
Itarare Sub-group, Carboniferous.

**Diagnosis:** Preserved wing 16 mm long and 9 mm wide; Sc branches bifurcate; M forking at the level of the first branch of R. Rs, M and CuA almost horizontal and parallel one to the other; CuA at least with seven simple oblique parallel branches; CuP arched.

**Description:** Wing with the apical part destroyed; the preserved portion 16 mm long and about 9 mm wide; inferred length 22-26 mm; anterior margin convex basally and almost straight at midlength; costal area around 1.5 mm wide; Sc ending 11 mm from base of wing at the level of the seventh branch of CuA; branches forked except, apparently, one near the base. R and Rs with their radial branches arising from their upper side; first branch of R arising 7 mm from base of wing, twice forked; second and third branches each forked; the following not clearly seen. R is only faintly curved. M straight parallel to Rs and CuA forked at the level of the second branch of R; the upper branch forking again just

before the level of the third branch of R; the first fork of M is symmetrical and the branches cannot be definitely said to arise from either side. CuA very long, gently curved directed to the apical margin of the wing; seven oblique parallel branches are seen downwards; width of cubital area around 4 mm; anal area 8 mm long. Archedictyon present.

**Remarks:** The present species is quite similar to *Phyloblatta indecisa* Cockerell, 1927 (p. 399, 400 Pl.6, fig.12; Pl.7, fig.20) from Upper Allegheny, Pennsylvanian, Upper Carboniferous, South Good Spring, Pennsylvania State, USA; it corresponds to *Commentry* in Europe. It differs from it in that:

- a) all Sc branches are forked;
- b) M is forking before, i.e., at the level of the second branch of R.

**Collector:** Euzebio Paulo de Oliveira – 1908

**Occurrence:** In a ravine east of Teixeira Soares, Município de Teixeira Soares, Parana State.



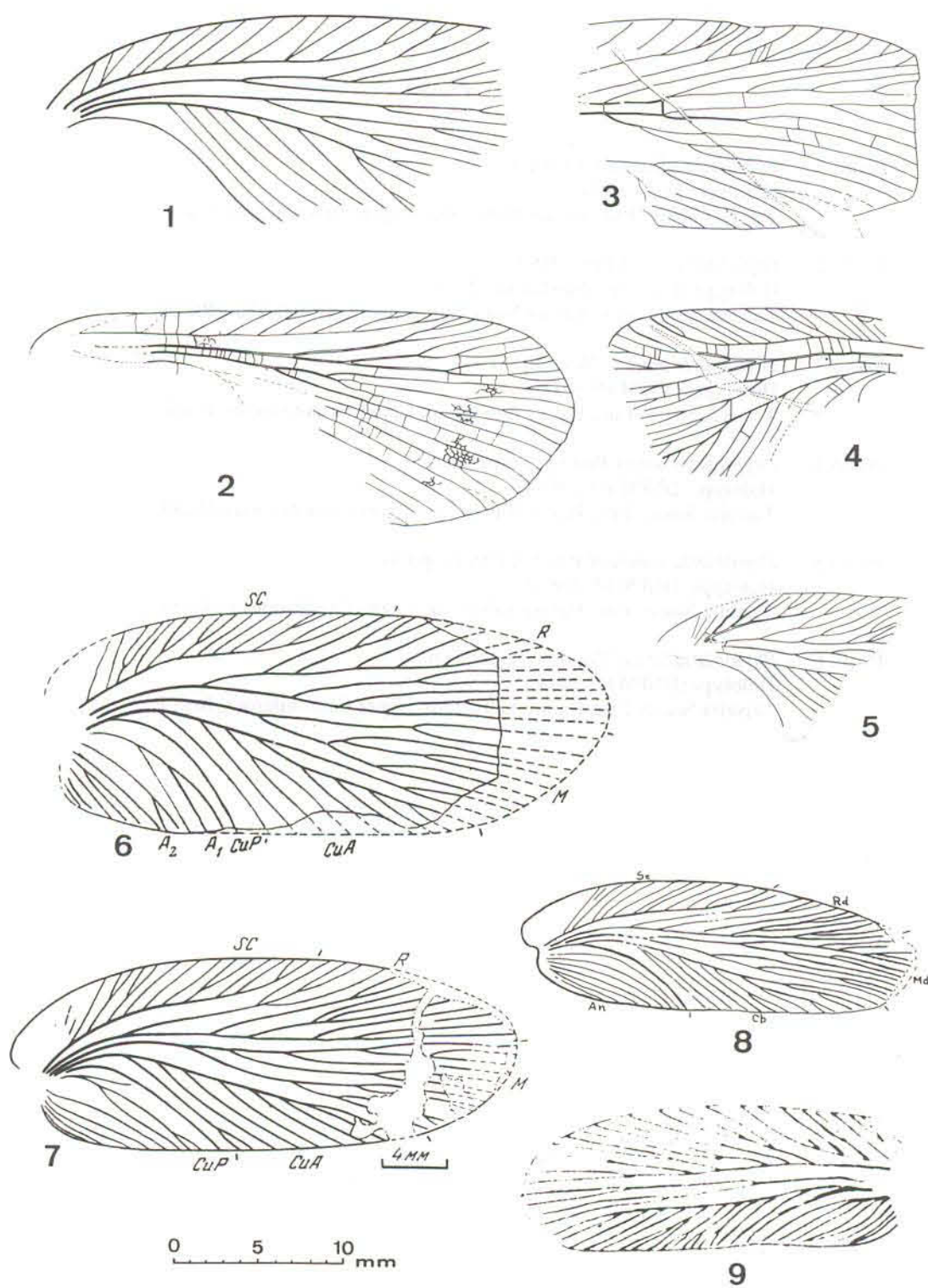


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## PLATE 1

- Fig. 1 – *Phyloblatta oliveirai* Carpenter, 1930  
Holotype: DGM-389-I  
Teixeira Soares Fm., Itararé Sub-group, Upper Carboniferous, Brazil.
- Fig. 2 – *Phyloblatta roxoi* Petri, 1945  
Holotype: I.G. Univ. São Paulo n° 205  
Teixeira Soares Fm., Itararé Sub-group, Upper Carboniferous, Brazil.
- Fig. 3 – *Phyloblatta pauloi* Mezzalana, 1948  
Holotype: DNPM n° 3911-I  
Teixeira Soares Fm., Itararé Sub-group, Upper Carboniferous, Brazil.
- Fig. 4 – *Phyloblatta langei* Pinto et Purper sp.nov.  
Holotype: DNPM n° 2981-I  
Teixeira Soares Fm., Itararé Sub-group, Upper Carboniferous, Brazil.
- Fig. 5 – *Phyloblatta sommeri* Pinto et Purper sp.nov.  
Holotype: DNPM n° 2982-I  
Teixeira Soares Fm., Itararé Sub-group, Upper Carboniferous, Brazil.
- Fig. 6 – *Phyloblatta tomiensis* Becker-Migdisova, 1961  
Lower Balachonian of the Kuznetz Basin.
- Fig. 7 – *Phyloblatta alykaeensis* Becker-Migdisova, 1961  
Lower Balachonian of the Kuznetz Basin.
- Fig. 8 – *Phyloblatta undata* Laurentiaux, 1950  
Commentry (Allier), Stephanian, France.
- Fig. 9 – *Phyloblatta indecisa* Cockerell, 1927  
Upper Allegheny, Pennsylvanian, U.S.A.





## PLATE 2

- Photo 1 – *Phyloblatta oliveirai* Carpenter, 1930  
Holotype: DGM-389-I  
Teixeira Soares Fm., Itararé Sub-group, Upper Carboniferous, Brazil.
- Photo 2 – *Phyloblatta roxoi* Petri, 1945  
Holotype: I.G. Univ. São Paulo n.º 205  
Teixeira Soares Fm., Itararé Sub-group, Upper Carboniferous, Brazil.
- Photo 3 – *Phyloblatta pauloi*, Mezzalana, 1948  
Holotype: DNPM n.º 3911-I  
Teixeira Soares Fm., Itararé Sub-group, Upper Carboniferous, Brazil
- Photo 4 – *Phyloblatta langei* Pinto et Purper sp.nov.  
Holotype: DNPM n.º 2981-I  
Teixeira Soares Fm., Itararé Sub-group, Upper Carboniferous, Brazil.
- Photo 5 – *Phyloblatta sommeri* Pinto et Purper sp.nov.  
Holotype: DNPM n.º 2982-I  
Teixeira Soares Fm., Itararé Sub-group, Upper Carboniferous, Brazil.
- Photo 6 – *Phyloblatta langei* Pinto et Purper sp.nov.  
Holotype: DNPM n.º 2981-I  
Teixeira Soares Fm., Itararé Sub-group, Upper Carboniferous, Brazil

