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A New Species of Palaeodictyopteran Insecta From Piedra Shotle Formation, Upper Carboniferous, Argentina

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Abstract - A new Upper Carboniferous Palaeodictyopteran Insecta *Archaeomegaptilus ferreirai* Pinto, sp. nov. from Piedra Shotle Formation, Chubut, Argentina is described. This species belongs exclusively to an Upper Carboniferous family, and constitutes one more datum for the age determination of Piedra Shotle Formation, Chubut, Argentina.

Resumo - No presente trabalho é descrito um novo inseto da Família Palaeodictyoptera do Carbonífero Superior, *Archaeomegaptilus ferreirai* Pinto, sp. nov., proveniente da Formação Piedra Shotle, Chubut, Argentina. Esta nova espécie pertence a uma família que ocorre exclusivamente no Carbonífero o que constitui mais um argumento em favor de uma idade carbonífera para a referida formação.

INTRODUCTION

The sample with Palaeodictyopteran Insecta studied was kindly provided by Professor Sergio Archangelsky. It comes from the Bed A, Profile NFC, La Casilda Section, left margin of the Arroyo Genoa, 3 km North of Piedra Shotle, Chubut, Argentina. The new species described belongs exclusively to an Upper Carboniferous family what reinforces the proposition for a Carboniferous age for the Piedra Shotle Formation (Pinto, 1992).

TAXONOMY

Ordo Palaeodictyoptera

Familia Archaeomegaptilidae Handlirsch, 1919

Diagnosis - Long wings, c-sc and sc-r areas relatively narrow; Sc reaching the apical border; r-rs areas broad with oblique veins; Rs areas, short with few branches, MA simple; MP branched; cross-veins forming a not very dense network with intercalary veins.

Remarks - Based on the above diagnosis it is also possible to include the genus *Parathesoneura* Sinitshenkova, 1977 (in Sharov & Sinitshenkova, 1977) in this family.

Archaeomegaptilus Meunier, 1908

Diagnosis - Archaeomegaptilidae insect, with long oblique sigmoidal veins in r-rs area.

Archaeomegaptilus ferreirai Pinto, sp. nov.

Pl. 1, Fig. 1; Pl. 2, Figs. 1-3

Derivatio nominis - In honour to Professor Candido Simões Ferreira.

Holotypus - One incomplete wing. Mus. Cien. Nat. Buenos

Aires, N° BA-PB-638 reverse and N° BA-PB-639 obverse.

Locus typicus - La Casilda Section Profile NFC, Bed A, Piedra Shotle, Chubut, Argentina.

Stratum typicum - Piedra Shotle Formation, Upper Carboniferous, Argentina.

Diagnosis - A large wing, over 100.0 mm long, relatively narrow c-sc and sc-r areas, broader basally with regularly disposed, straight cross-veins, large radial area with very long, strong inclined sigmoidal veins, and a thin network of cross-veins. Cross-veins scattered over a large part of the wing forming polygonal cells and intercalary veins. First branch of RS vein inclined toward the apex and distally inclined backward to the posterior border, and the last two branches directly toward the apex. The first branch of RS forks into two branches and the second branch forks twice. Round, slightly colored markings are irregularly distributed over all the wing area.

Description - A fragment of a long wing, measuring 76.0 mm in length and 20.0 mm in width. The complete wing must have been longer than 100.0 mm. The anterior margin almost straight, curving slightly downward at the last quarter part; posterior margin and apex not preserved; c-sc and sc-r areas relatively narrow, are broader basally, usually with straight cross-veins regularly disposed; very broad r-rs area with very long, strong, oblique sigmoidal veins in a light pattern of cross-veins. RS with three branches: a little farther the first branch forks into two long branches, each of them with thin secondary branches directed toward the next branch, and the last distal branch directed to the posterior border; a little farther the second branch of RS, bifurcates at the same level of the first branch, into two long branches almost parallel to RS and directed toward the apex: each of these branches bifurcates again distally; the third branch of RS is represented by a small basal part only, parallel to RS and directed toward the apex. The secondary branches originated from those of RS obliquely directed and linked to

the next branch, are thin branches appearing just as part of the network; MA a long arched vein. Between the wing branches there is a thin network of cross-veins forming polygonal cells and intercalary veins. There is an obverse fragment of the wing BA-PB-639, (Pl. 1 Fig. 1) which presents good details of the wing veins and color markings.

Remarks - The new species (Pl. 1, Fig. 1) presents great similarity with *Archaemegaptilus kiefferi* Meunier, 1908, p. 173, fig. 3 (Pl. 1, Fig. 2). This species was revised by Lameere, 1917, p. 160 who makes the following statement: "*Archaemegaptilus kiefferi* F. Meun., Ann. de Paléont. IV, 1909, p. 138, fig. 9, pl. II. fig. 2. - La figure de M.F. Meunier est exacte, mais la nervure qu'il interprète comme dernier rameau du secteur de la radiale est la médiane antérieure, laquelle est simple. La contre-empreinte de ce fossile, non décrite par M. F. Meunier, montre l'aile presque au complet: elle a 30 millim. dans sa plus grande largeur et un peu plus de 10 centimètres de long. La nervation a beaucoup d'analogie avec celle des genres *Mecynoptera* Handl. et *Dictyoptilus* Ch. Brongn., et aucune avec celles des genres *Megaptilus* Cb. Brongn. et *Megaptiloides* Handl. Le genre *Archaemegaptilus* ne diffère du genre *Dictyoptilus* que par la sous-costale s'étendant jusqu'à l'extrémité de l'aile. La tige de la médiane est accolée à la radiale sur un trajet assez long, et la cubitale antérieure est courbée vers la médiane. La sous-costale s'étend jusqu'à l'extrémité de l'aile. La médiane postérieure se divise près de sa naissance en deux branches toutes deux bifurquées, le rameau postérieur de la seconde branche étant fouchu; la cubitale antérieure est simple, la cubitale postérieure fouchue avec le rameau antérieur longuement bifurqué; le champ anal est effacé dans le fossile". Later this species was redescribed by Kukalová, 1969, (p. 475-479 fig. 46), that added a basal part to the type based on *Dictyoneurella perfecta* Laurentiaux, 1949. Kukalová (op. cit.) discusses and adds new data for the family Archaemegaptilidae Handlirsch, 1919 and redefines the genus and the type species of *Archaemegaptilus kiefferi* Meunier, 1908. As only part of the wing of this species was known, the basal part is missing. Kukalová, supposing that *Dictyoneurella perfecta* Laurentiaux, 1949 belongs to the same family, uses it to complement the characteristics of *A. kiefferi* (Pl. 1 Fig. 3) Kukalová (op.cit.) fig. 46. However the suggestion and reconstruction made by that author, present some difficulties to be accepted. So, the wide space between C and Sc in *D. perfecta* (Pl. 1 Fig. 4) contrasts with the relatively narrow space in *A. kiefferi* (Pl. 1 Fig. 2); the large r-rs area with oblique veins in *A. kiefferi* is in contrast with the very narrow r-rs area in *D. perfecta* without long oblique veins; the very long Sc vein reaching the apex in *A. kiefferi* and also the shape of the wing are other differences from *D. perfecta*.

Much more similar to *A. kiefferi* (Pl.1, Figs.2,3) is *Parathesoneura carpenteri* Sinitshenkova, 1977 (Pl. 1 Fig.

5), in particular if compared with the paratype N° 3115/190, fig. 2a p. 5B, (Sharov & Sinitshenkova, 1977) from the Carboniferous of Tungursk, Russia. It presents the same main veins disposition of the including long Sc, large r-rs area with oblique veins and reticulate cross-veins with intercalary sectors.

The new species differs from *A. kiefferi* in having the branches of RS with thin secondary branches, the second branch of RS is simple in *A. kiefferi* and forks twice in the new species. Nevertheless, these branches of *A. kiefferi* are more inclined to the posterior border than those of the new species which are more directed toward the apex, and the r-rs veins are much longer in the new species. The new species differs from *Parathesoneura carpenteri* Sinitshenkova, 1977, in having RS branches forked while in *P. carpenteri* all four branches are simple and the r-rs veins are short. *Carbonoptera furcaradii* Guthörl, 1940, presents some similarity in the vein disposition, even in the presence of a secondary vein linking one branch of RS to another, however it is a very small wing and does not present the typical network.

Occurrence - La Casilda Section, Profile NFC, Bed A, Piedra Shotle, Chubut, Argentina associated to plant remains (Archangelsky, 1981; Gamero & Archangelsky, 1981) and to another insect: *Breyeria brauckmanni* Pinto, 1992.

Collectors - Sergio Archangelsky, Juan Carlos Gamero, Raul Leguizamon and Edegaro J. Romero.

CONCLUSIONS

The two insects found at Piedra Shotle Formation, Argentina belong to two families of Palaeodictyoptera: Breyeriidae Handlirsch, 1906 and Archaemegaptilidae Handlirsch, 1919.

Considering:

a) That all species of Breyeriidae have been found in the Carboniferous, fourteen species in Westphalian or Stephanian of Belgium, USA, France, Germany, Netherlands, England, Russia (Siberia); and two species in the Namurian of Czechoslovakia and Germany.

b) That the Archaemegaptilidae to which the new species belongs occurs only in the Stephanian of Commeny (Allier), France.

The author is induced to once more believe in Upper Carboniferous age to the Piedra Shotle Formation of Argentina.

Acknowledgments - Many thanks to Professor Sergio

Plate 1

Figure 1 - *Archaemegaptilus ferreirai* Pinto, sp. nov. Upper Carboniferous, Argentina.

Figure 2 - *Archaemegaptilus kiefferi* Meunier, 1908. Upper Carboniferous, France. Original by Meunier, 1909.

Figure 3 - *Archaemegaptilus kiefferi* Meunier, 1908. Upper Carboniferous, France. Reconstruction by Kukalová, 1969.

Figure 4 - *Dictyoneurella perfecta* Laurentiaux, 1949. Westphalian, France.

Figure 5 - *Parathesoneura carpenteri* Sinitshenkova, 1977. Upper Carboniferous, Russia.

5a Holotypus 5b-c Paratypes.

Figure 6 - *Carbonoptera furcaradii* Guthörl, 1940. Upper Carboniferous, Germany.

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Plate 2

Archaeomegaptilus ferreirai Pinto, sp. nov. *Holotypus* Mus. Ciênc. Nat., Buenos Aires N° BA-PB-638, and N° BA-PB-639. Piedra Shotle Formation, Upper Carboniferous, Chubut, Argentina.

Figure 1. Total of the specimen.

Figures 2a-b. The wing in two enlarged pieces.

Figure 3. The reverse piece of rock, showing the light round spots of the wing.

1

2a

2b

3