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Velisoptera taschi nov.gen., nov.sp. a Carboniferous Insect from Bajo de Velis, Argentina

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Abstract- The monotypic *Velisoptera taschi*, nov.gen., nov.sp. is another new pterygote insect from the Pallero member of the Bajo de Velis formation, Upper Carboniferous, Argentina. It represents a new family, Velisopteridae, of the Diaphanopterodea.

Keywords: Insecta, Carboniferous, Argentina

INTRODUCTION

The age of Bajo de Velis formation, of the Provincia San Luis, Argentina, dated by some paleobotanists as Upper Carboniferous and by others as Lower Permian but the associated entomofauna and the arachnids suggest an Upper Carboniferous age. The analysis of divergent opinions concerning the paleobotanical and paleozoological data is discussed by Pinto (1995), who concluded an Upper Carboniferous age for the Pallero member of the Bajo de Velis formation. The last species described, *Rigattoptera ornellasae* Pinto, 1996, and the present species supports the argument to date this unit as Upper Carboniferous.

TAXONOMY

ORDO DIAPHANOPTERODEA Handlirsch, 1919
VELISOPTERIDAE Pinto & Adami-Rodrigues, nov. fam.

Diagnosis - Large wings held backward over the abdomen, with: anterior margin and stems of main veins arched basally; SC terminating on C near the apex; origin of RP near the wing base; main veins RA, MA, CuA strong and unbranched; MA arising apparently from the anterior branch of MP; crossveins regular unbranched; round spots between veins, all over the wing.

Generotype *Velisoptera* Pinto et Adami-Rodrigues, nov. gen.

Remarks - In the venation the new species is very similar to certain species placed in the Palaeodictyoptera group. But as several of them were found as isolated wings, it is not sure if they also could have held the wings backward over the abdomen, in this case they cannot belong to that order but are to be placed in the Diaphanopterodea. For this reason, comparisons with some of those species will be done in spite of the fact that they have been included in that order. The new species is strongly similar to *Macroptera antiqua* Laurentiaux, 1949 from the Carboniferous of the "terrain houiller du Nord de la France"

in the disposition of the main veins, but differs mainly in the regularity of crossveins at the costal area, RP raising more basally, and by the presence of round spots. That species was grouped with the Palaeodictyoptera, but it is an isolated wing and may not belong to that order as some other isolated wings.

The same applies to *Lusiella fariai* Laurentiaux & Teixeira, 1958 from the Upper Carboniferous of France and Portugal. The new species is similar in the disposition of the veins and crossveins but differs in having three branches in RP, not four, and the last one with two branches, not four as in that species, MP also with three branches, not four, and by the presence of round spots.

It is interesting to notice a similarity with *Psychroptilus burrettiae* Riek, 1976 from the Winyard Tillite, Later Carboniferous of Tasmania, which, like the present species is associated with *Botrychiopsis plantiana*. The Tasmanian species shows strong similarity in the venation but could be differentiated from the new species by having the wings outstretched and in being smaller. It is notable that Riek (op.cit.) found great difficulty to classify his species in Palaeodictyoptera or Megasecoptera in spite of the stretched out wings. Another species with closely resembling venation is *Madera mamayi* Carpenter, 1970 from the Madera Fm., Pennsylvanian, of New Mexico. The author placed it in the Palaeodictyoptera but it has the left wing held backward over the abdomen although the right wings are stretched out. The photo, fig.1 of Carpenter (op.cit.), shows that the wings could have turned into this position by the action of water current and then not be a Palaeodictyoptera. One can come to this conclusion by two facts: the position of the left wing over the abdomen and in particular because the posterior half of the abdomen is turned out in the same direction as the right wings. It differs from the new species mainly because it is very small 15.0 mm in comparison with the 106.0 mm of wing length in the new species, and having a much larger radial area.

Another species, *Tchirkovaea guttata* Zalesky (1931), described by Sinitshenkova (1979) from the

Carboniferous of the Siberian Tunguska and Kuznetzk basins includes some specimens (Pl. VII, fig. 6 and text-fig. 2) with strong similarity with the new species. Sinitshenkova accepted the problems of their systematic position and discusses the possibilities of grouping them with the Palaeodictyoptera, Megasecoptera or Diaphanopterodea. The specimen of her figure 2, photo shows great similarity in the venation and the presence of round spots but differs in having the crossveins not perfectly straight. On the other hand, she also published several further drawings that strongly differ from figure 2. This leads great difficulties in knowledge of the exact characteristic features of the species.

Meunier (1912) described *Homaloneura similis* from the Carboniferous of Commentry (Allier) France, and noted that the new material probably "permettron peut-être de démembrer ce fossile des Homaloneura". That species presents a very similar venation, also in the arrangement of the crossveins, in comparison with the new species but differs in having MP and CuP unbranched, and in being smaller and narrower. With the relation between length and width being 30.0 mm to 7.5 mm.

Because the new species combines the venation of the Palaeodictyoptera and of the closely related Diaphanopterodea with the ability of turning the wings back over the abdomen, was preferred to place it in the latter order.

Velisoptera Pinto et Adami-Rodrigues, nov. gen.

Diagnosis - Velisopteridae with SC terminating on the costa near the apex; RA slightly concave, ending in the middle of the apex; RP originating just beyond the origin of MA, sending off three branches; MP branched; anal veins unbranched. All veins parallel to each other.

Type species: *Velisoptera taschi* Pinto & Adami-Rodrigues, nov. sp.

Velisoptera taschi Pinto et Adami-Rodrigues, nov. sp.

Text-fig. 1 and 2, Pl. 1, fig. 1 and 2a-b, Pl. 2, fig. 1a,b and 2a-b

Designatio nominis - In honour to Emeritus Professor Paul Tasch of the Wichita State University, USA

Holotype - One wing imprint. Museo Univ. Nac. Cordoba n° CORD-PZ-2098

Paratypes - Two thoracic impressions. Museo Univ. Nac. Cordoba n° CORD-PZ-2102 a,b; 2103a,b. and 3201

Locus typicus - Bajo de Velis, Pcia San Luis, Argentina

Stratum typicum - Pallero Member, Bajo de Velis formation, Upper Carboniferous, Argentina.

Figure 1 *Velisoptera taschi*, nov. gen. nov. sp. Holotype CORD-PZ-2098. Universidad Nacional de Cordoba. Pallero member, Bajo de Velis formation, Upper Carboniferous, Argentina

PLATE 1

Velisoptera taschi, nov. gen., nov. sp.

Figure 1 - Right wing and part of the thorax.. From the Pallero Member, Bajo de Velis formation, Upper Carboniferous of Bajo de Velis, San Luis, Argentina.

Holotypus - Univ Nac. Cordoba n° CORD-PZ-2098. Natural size.

Figures 2a,b - Thorax and possible structure of the head and paranotal lobe. Univ Nac.. Cordoba n° CORD-PZ-2103 a,b. Natural size.

Fig. 1

Fig. 2a

Fig. 2b

Diagnosis - Large wing; length 106.0 mm, width about 53.0 mm, proportion 2.3:1. RP with three branches directly toward the limit apex -posterior margin; the third one bifurcates near its origin. MP forks before the bifurcation of the third branch of RP, its first branch is single, the second bifurcates again at midlength; unbranched anals.

Description - Large wing with a length of 106.0 mm and a width of about 53.0 mm. Costal margin slightly concave at the posterior two thirds and convex at the anterior third; apex round; C arched strongly at the base of the wing; costal and subcostal area equal and both moderately wide; SC separated from C just at the basal arch, and after curving a little backward, it runs forward and parallel to C and RA until almost the apex where it ends on C; RA arched basally, runs almost straight until the level where SC ends on C where it curves strongly towards the middle of the apex of the wing; RP has its origin near the base just after the origin of MA, running parallel to RA, leaving a radial anterior area which is a little larger than the costal and subcostal areas; RP sends off three parallel branches which run obliquely towards the limit of the apex and the posterior margin of the wing; the first two branches are simple, the third one bifurcates just after its origin; unbranched MA originates from MP near the wing base, a little before the origin of RP, and runs obliquely toward the posterior margin in a slight curvature; MP is separated from MA at the base of the wing and bifurcates a little after the origin of the fork of RP, the first branch is undivided, and runs parallel to MA; the second branch bifurcates a little behind midlength; CuA is strong, unbranched, slightly curved and runs obliquely toward the posterior margin; CuP originated at the wing base and bifurcates at midlength, the first branch undivided, the second forks soon, giving origin to two simple branches, apparently there are four simple anal branches.

The wing surface is fully covered with round spots between the veins and apparently straight crossveins exist between each spot. Three further slabs were found with the sample which display part of the body (Text-fig.2, Pl. I and Pl. II) and probably belong to the same species. By very careful observation and with great difficulty it is possible to recognise the possible morphological characteristics of the thorax and head of the specimens.

Figure 2. *Velisoptera taschi*, nov. gen., nov. sp. Reconstruction of head and thorax based on the paratypi. CORD-PZ-2102 ab, 2103 ab and 3201 of the Universidad Nacional de Cordoba. Pallero Member, Bajo de Velis formation, Upper Carboniferous, Argentina.

As can be seen in figures 2 and Pl. I, fig.2a,b and Pl. II fig.a-b 3a,b, the mesothorax and the metathorax have almost the same size, with the width (15.0 mm) being a little larger than the length (13.0 mm). The prothorax, apparently, is much longer than the mesothorax and probably of the same width and may have large paranotal wings. As recognisable in fig 2, the head is small with large eyes and multisegmented antenna.

These data have been very difficult to obtain because the anterior part of the prothorax and the head are very poorly impressed. Part of the abdomen and a cercus are seen on a fourth slab (fig.2 Pl.II,fig.2). The cerci are long and terminally spatulate (Pl. II, fig.2b).

Occurrence - In silty blackish shales of the Bajo de Velis formation at Bajo de Velis, Provincia de San Luis, Argentina, associated with megasecopteran, diaphanopteran and protorthopteran insects, trigonotarbid arachnids, pollen, spores and plants (Pinto, 1995).

PLATE 2

Velisoptera taschi, nov. gen., nov. sp.

From Pallero Member, Bajo de Velis formation, Upper Carboniferous of Bajo de Velis, San Luis, Argentina.

Figures 1a,b - Thorax. Univ.Nac.Cordoba n° CORD-PZ-2102 a,b. Natural size.

Figure 2a End of abdomen and cercus Univ.Nac. Cordoba n° CORD-PZ-3201. Natural size.

Figures 2b,c - The same magnified 1.6x

Fig. 1a

Fig. 1b

Fig. 2a

Fig. 2b

Fig. 2c

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