



Two new roachoid specimens from the Carboniferous of the Reyran massif, Var, France (Holopandictyoptera, Archimylacridae, Phyloblattidae)

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Abstract. – We describe the second representative of the phyloblattid genus *Anthracoblattina* from the late Carboniferous Reyran Basin (Esterel, Var Department, France). This specimen represents a distinct species that differs from the previously described taxon from the same area by having a shorter ScP vein, a broader area occupied by vein M, and a shorter wing overall, thereby confirming the underestimated diversity of Carboniferous insect assemblages of the region. In addition, we also report and describe an unnamed representative of the family Archimylacridae from the same outcrop, constituting the first record of this family from the area.

Résumé. – Deux nouveaux spécimens de blattes du Carbonifère du massif de Reyran, Var, France (Holopandictyoptera, Archimylacridae, Phyloblattidae). Nous décrivons le deuxième représentant du genre de phyloblattidés *Anthracoblattina*, découvert dans le Carbonifère supérieur du bassin du Reyran (Estérel, département du Var, France). Il appartient à une espèce se différenciant de la première trouvée dans la même zone, par une nervure ScP plus courte, une nervure M couvrant une zone large et une aile plus courte, confirmant la diversité des assemblages d'insectes carbonifères du site. Nous décrivons également un Archimylacridae non nommé provenant du même affleurement, premier représentant de cette famille dans la région.

Keywords. – *Anthracoblattina*, *Archimylacris*, Dictyoptera, Esterel, Insecta, new record, paleodiversity.

Recent field investigations have shown that the Var Department is a promising area for the discovery of Carboniferous insects, with two main fossiliferous localities: Tante Victoire near Six-Four-les-Plages in the western part of the department, and the Reyran Basin (Esterel Massif) in the eastern part. Both sites can be approximately dated to the Gzhelian and are separated by about 100 km (BRGM, 1969; TOUTIN-MORIN *et al.*, 1994). To date, the Tante Victoire locality has yielded representatives of Blattinopsidae, Paoliidae and Phyloblattidae (NEL *et al.*, 2022a, 2023), whereas the Reyran Basin has produced a Mylacridae, a Phyloblattidae, two additional roachoid taxa, an undetermined Palaeodictyoptera (GARROUSTE *et al.*, 2025), fossil plants, and an undescribed arachnid.

Here, we describe two roachoid specimens distinct from those previously reported from the Reyran Basin: a new forewing attributed to the phyloblattid genus *Anthracoblattina* Scudder, 1879, and an undetermined genus and species of Archimylacridae. These new finds further confirm the high potential of this area for late Carboniferous insect diversity. The region, which includes Permian and Carboniferous basins as well as the metamorphic Massif des Maures, has been proposed as a candidate UNESCO Global Geopark (“Socle de Provence”). In addition, new Permian ichnite occurrences have recently been discovered in the same area (unpublished data).

MATERIALS AND METHODS

The specimens were collected during field research in a very limited excavation (approximately 120 cm³ in volume) in the spring of 2025 by one of us (J.-C.L.), along a forest road near the ancient coal mining site of Boson (L’Esquive). The associated plant assemblage is reduced essentially to an accumulation of leaves of *Sphenophyllum* sp. and of *Cordaites* sp. (one is preserved together with specimen MNHN.F.C02462), with seeds of *Cordaicarpus* sp. and rare leaves of *Pecopteris* sp. The precise locality is kept confidential; for information, please contact J.-C.L.

The specimens were photographed using a CANON IXUS 285 HS. Wing venation nomenclature follows SCHUBNEL *et al.* (2020), especially concerning the presence of a postcubital vein in Pterygota.

Abbreviations. – **AnA**, first branch of anal vein; **AnP**, second branch of anal vein; **C**, costal vein; **CuA**, cubitus anterior; **CuP**, cubitus posterior; **M**, median vein; **MA**, median anterior; **MP**, median posterior; **PCu**, postcubital vein; **RA**, radius anterior; **RP**, radius posterior; **ScP**, subcostal posterior.

RESULTS

Clade **Holopandictyoptera** Kluge, 2010

(= total group of extant Dictyoptera Leach, 1815)

Plesiomorphon **Eoblattodea** Laurentiaux, 1959 (*sensu* LI, 2019)

KLUGE (2010: 32) defined Holopandictyoptera as follows: “HOLOPANDICTYOPTERA taxon nov. for the Pandictyoptera s.l. (including Palaeoblattariae with their long ovipositor and no outer genital chamber) and CRYPTOVIPOSITORIA taxon nov. for the Pandictyoptera s. str., with ovipositor reduced and hidden (completely or partly) in the outer genital chamber formed by the enlarged abdominal sternum 7. Thus, the name Dictyoptera and its monosemantic circumscriptive synonyms Panisoptera, Blattopteroidea and Isoptera are non-monosemantic circumscriptive synonyms of Holopandictyoptera and Cryptovipositoria. Holopandictyoptera and Cryptovipositoria”. Here, we consider that the Palaeozoic roachoids belong to the stem group of the extant Dictyoptera (Blattodea and Mantodea), because they share at least a unique synapomorphy in the strongly concave and curved forewing vein CuP (PROKOP *et al.*, 2014).

The term Dictyoptera also corresponds to the Mantides Latreille, 1802 *sensu* VRŠANSKÝ (2024).

Family **Phyloblattidae** Schneider, 1983

Genus *Anthracoblattina* Scudder, 1879

Anthracoblattina sp. (fig. 1)

Material examined. – Specimen MNHN.F.C02461 (IF-EST-106, a nearly complete forewing with the basal part of the costal area and the extreme wing apex missing), stored at Muséum national d’Histoire naturelle, Paris, France.

Age and outcrop. – Gzhelian-Kasimovian (Stephanian A) (BASSO, 1987; CREVOLA *et al.*, 1991), locality BOS 7, L’Esquine, Reyran Massif, Esterel, eastern part of Var department, France.

Description. – Forewing ca. 34.5 mm long, 12.2 mm wide; costal area 2.2 mm wide, strip-like, up to about 67 % of forewing length; ScP anteriorly pectinate, with nearly all branches simple and ending at anterior wing margin; R very slightly sigmoidal; RA and RP separating ca. 10.6 mm distad wing base, slightly distad fork of M; RA with four branches terminating at anterior wing margin; RP likely just anterior to wing apex, with six apical branches; M not sigmoidal, with 10 apical branches, and covering a rather broad area; CuA base located 2.3 mm distad wing base, CuA covering a broad area, with nine branches; CuP+PCu weakly curved; veins in anal area parallel to CuP and ending at posterior margin of wing, with first anal vein well separated from CuP+PCu.

Remarks. – This tegmen of roachoid is strongly different from those already described from the same area, as the mylacrid ‘*Opsiomylacris* sp.’ has a much broader costal area, the ‘Dictyoptera family undetermined Gen. et sp. A’ has a more curved CuP, and the ‘Gen. et sp. B’ has a RA vein with only two branches (GARROUSTE *et al.*, 2025).

The very long distal-most branch of ScP (fig. 1) supports affinities with the families Subioblattidae Schneider, 1983, Phyloblattidae Schneider, 1983, Compsoblattidae Schneider, 1978, and Spiloblattinidae Handlirsch, 1906 (SCHNEIDER, 1983). Affinities with the Subioblattidae (Triassic) are excluded because these have the vein RP and its branches sigmoidally curved (PAPIER & NEL, 2001; BELAHMIRA *et al.*, 2019). The Compsoblattidae (unique genus *Compsoblatta* Schlechtendal in HANDLIRSCH, 1907) have a strongly sigmoidal vein CuA with a distinct anterior branch, vs regularly posteriorly curved and pectinate in the new fossil. SCHNEIDER (1978: 24; 1982: 28) proposed the following diagnosis for the Spiloblattinidae (translated from German): ‘wings with broad areas between the main veins, these having few branches. Costal field ribbon-shaped, R and especially M only far from the base distantly forked or branched, CuA sigmoidally curved. In the new fossil, CuA is not sigmoidal and the veins R and M are forked in the basal fourth of the wing. Furthermore, the Spiloblattinidae have broader areas between the main veins in their basal parts than the Phyloblattinidae, much narrower in their distal parts, especially between ScP and R and between M and CuA (NEL *et al.*, 2022b). Thus, we attribute the new fossil to the Phyloblattidae. The differences between the different genera in Phyloblattidae are not very pronounced and the genera look hardly separable (see SCHNEIDER, 1983: pl. 3, figs 1-6). An attribution to the genus *Phyloblatta* Handlirsch, 1906, is unlikely because it does not possess the characters of this genus, viz. R and M rather sigmoidal vs rather straight in the new fossil (see diagnosis by BELAHMIRA *et al.*, 2019). *Aissoblatta* Handlirsch, 1904, has a strongly sigmoidal stem of M (SCHNEIDER, 1983: pl. 3, fig. 5). *Xenoblatta* Handlirsch, 1906, *Kunguroblattina* Martynov, 1930, and *Kashmiroblattina* Verma, 1967, have a strongly curved CuP+PCu vs less curved in the new fossil (SCHNEIDER, 1983: pl. 3, figs 3-4 and 6). The new fossil shares with *Anthracoblattina* Scudder, 1879, a more smoothly curved

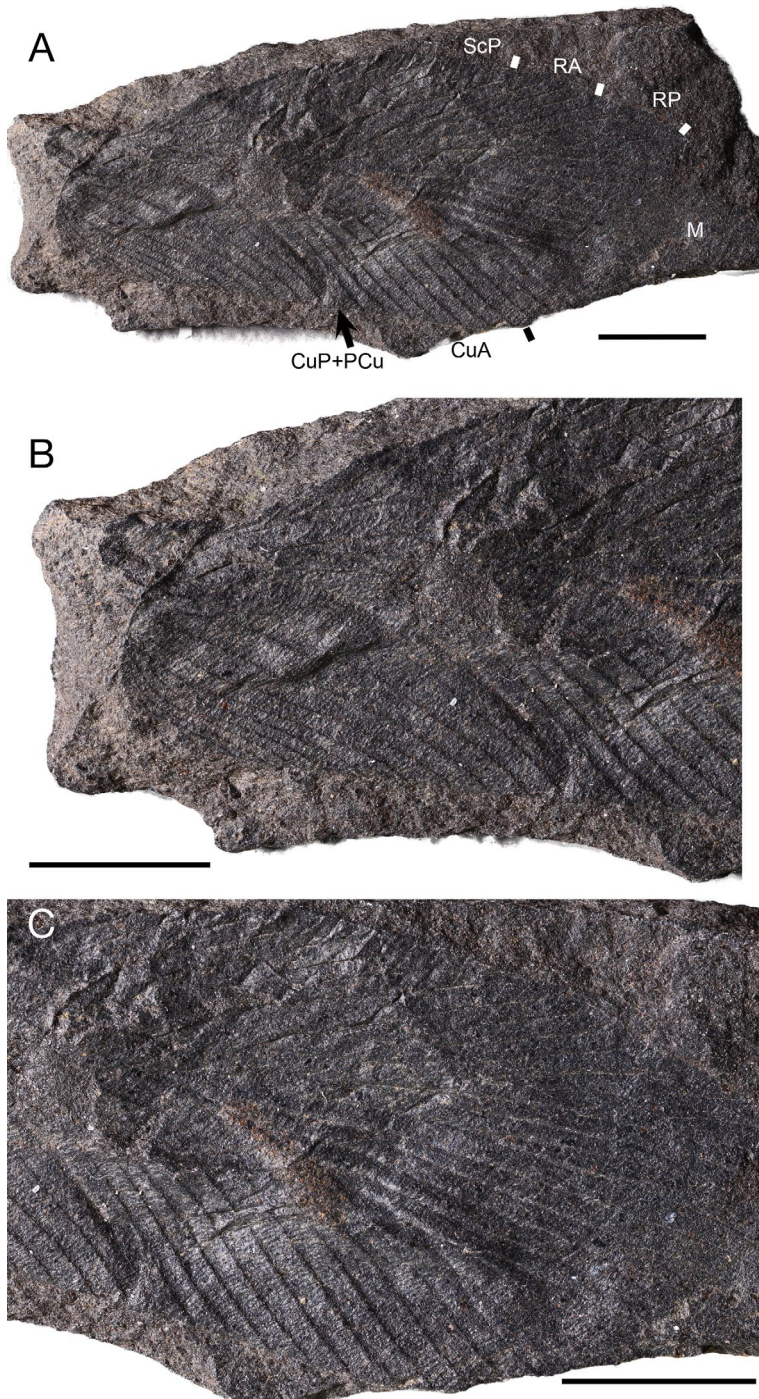


Fig. 1. – *Anthracoblattina* sp., specimen MNHN.F.C02461. Photographs of forewing. – A, General view. – B, Basal part. – C, Distal part. Scale bars: 5 mm.

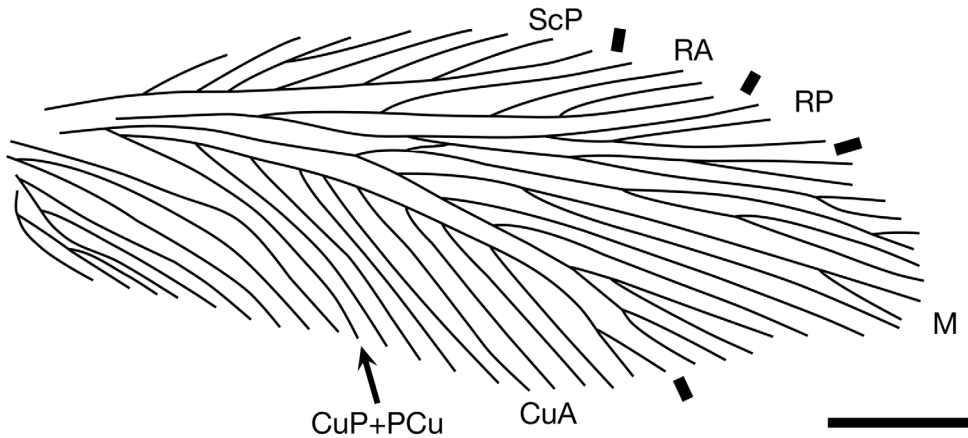


Fig. 2. - *Anthracoblattina* sp., specimen MNHN.F.C02461. Reconstruction of forewing. Scale bar: 5 mm.

CuP+PCu, a RA with four long anterior branches, and stems of R and M rather straight (SCHNEIDER, 1983: pl. 3, fig. 2). SCHNEIDER *et al.* (2017: 324) characterized the genus *Anthracoblattina* 'by four characteristic features of the forewings: the distinct narrowing of the strip-like costal field near the wing base, the first forks of both R and M located between the first third and the half of the wing length, the straight CuA, and a broad interspace between CuP and AnA', all present in the new fossil. Also, BELAHMIRA *et al.* (2019: 958) proposed the following diagnosis for *Anthracoblattina*: 'Elongate ellipsoidal forewings of up to 50 mm length, up to three times as long as wide [2.8 times as long as wide in the new fossil]. Costal field basally up to half as wide as distally, about 70%–75% of forewing length [65% in the new fossil]. Sc with pectinate branches inclined apically, some branches forked [present in the new fossil]. R weakly sigmoidal, multiple forked with the first fork originating anterior to the distal end of the anal field, branches terminating anterior to the wing tip on the anterior wing margin [present in the new fossil]. M divided shortly behind the first fork of the R stem into multiple-forked MA and MP, branches covering an area extending from the wing tip to the transition between wing tip and posterior wing margin [present in the new fossil]. CuA runs, after the basal curve, inclined and more or less straight toward the posterior wing margin [present in the new fossil]; first posteriorly pectinate twigs arise mainly by branching from CuA stem [present in the new fossil]; all further branches arise by (multiple) forking [no multiple forking in the new fossil]. Basal part of CuP gently curved, apical part straighter [present in the new fossil]. AnA simple and clearly separated from basal CuP and from first AnP. AnP branches simple or forked [present in the new fossil]. Crossvenation reticulate and/or anastomosing-striate [not preserved in the new fossil]'. An attribution to *Anthracoblattina* is the most probable one, considering the strong variability in the venation of the roachoids. An attribution to a precise species in this genus makes little sense, as already indicated by NEL *et al.* (2023).

NEL *et al.* (2023: 308-309, fig. 2) described a specimen they attributed to '*Anthracoblattina ensifer* cf. *desguini* Meunier, 1921' from the Gzhelian of the outcrop of Tante Victoire (western part of Var department, near Toulon, France). This specimen differs from the new fossil in the longer vein ScP, vein M covering a narrow area vs covering a broad one, and a longer wing, ca. 39.5 mm vs. 34.5 mm in the new fossil. They probably belong to different species.

Family **Archimylacridae** Handlirsch 1906**Genus and species undetermined** (possibly *Archimylacris* Scudder, 1868) (fig. 2)

Material examined. – MNHN.F.C02462 (IF-EST-107, part and counterpart of a fragment of forewing with anal area and apical part missing), stored at Muséum national d'Histoire naturelle, Paris, France.

Age and outcrop. – Gzhelian-Kasimovian (Stephanian A) (BASSO, 1987), locality BOS 7, L'Esquine, Reyran Massif, Esterel, eastern part of Var department, France.

Description. – Fragment of forewing 28.9 mm long, forewing ca. 30 mm long, 14.3 mm wide; costal area ca. 20 mm long, 3.1 mm wide, broad, not strip-like, up to about 65 % of forewing length; ScP anteriorly pectinate, with nearly all branches simple and ending at anterior wing margin; R with a pronounced fork into RA and RP making a rather open angle well

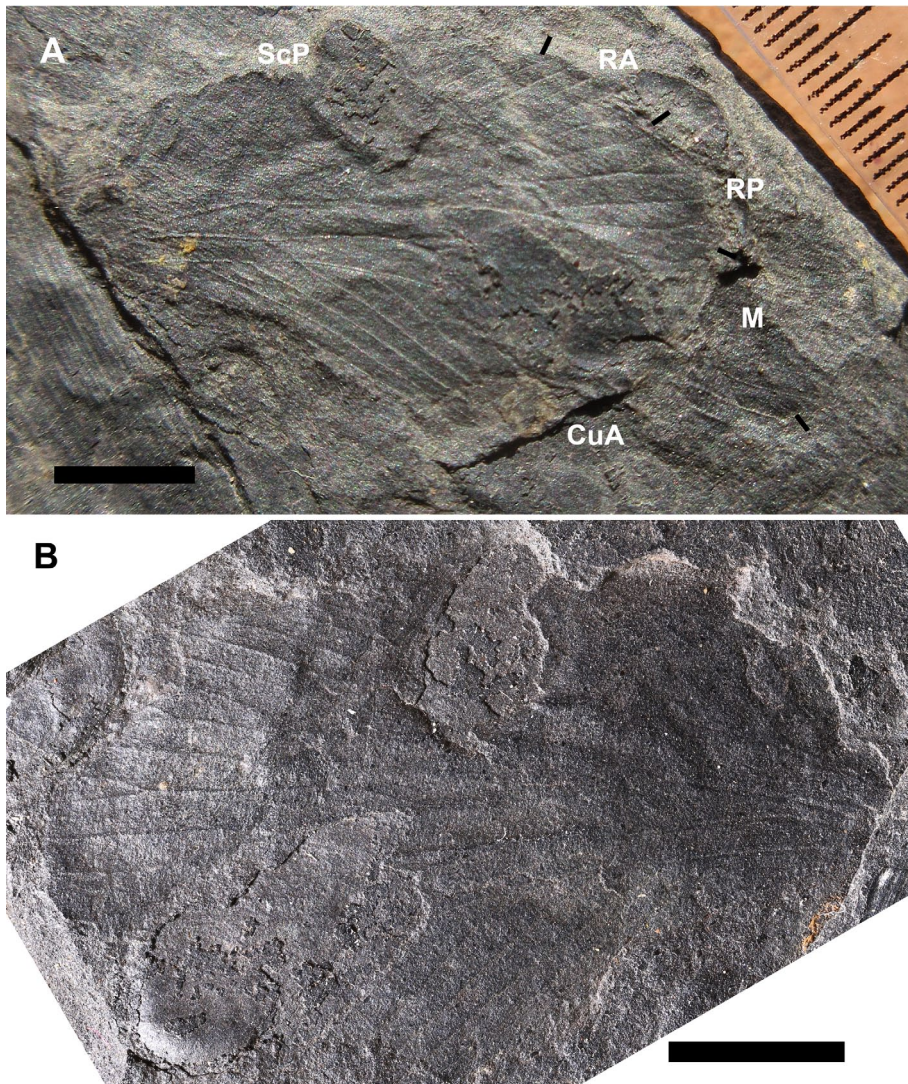


Fig. 3. – Archimylacridae genus and species undetermined (possibly *Archimylacris*), specimen MNHN.F.C02462 (specimen 7720). Photograph of forewing. – A, Part. – B, Counterpart. Scale bar: 5 mm.

basal fork of M; RA with four branches terminating at anterior wing margin; RP also with four branches, ending just anterior to wing apex; M straight with two distinct main branches and ca five apical branches; a distinct oblique crossvein between M and CuA (arculus); CuA weakly curved, posteriorly pectinate with six preserved simple branches covering a broad area; CuP+PCu and veins in anal area not preserved.

Remarks. – SCHNEIDER (1983: 108) proposed the following diagnosis for this family (English translation from German): Oval to lanceolate forewings with a band-shaped to triangular costal area and a simple, arched Cu1 [CuA], arising from the Cu2 [Cu] at a certain distance from the wing base. R and M are dichotomously forked into R1 [RA], R2 [RP], and M1/M2. Veins are concentric at the base'. All these characters are present in the new fossil. The broad and rather short costal area, ScP anteriorly pectinate and with few forked branches, and the presence of an oblique crossvein between M and CuA (arculus) are characters of the archimylacrid genus *Archimylacris* (LAURENTIAUX, 1967; SCHNEIDER, 1983: pl. 2, fig. 1). The lack of information on the basal part of the costal area, on vein CuP+PCu and the anal area forbids us to precisely determine the affinities of the new fossil. The Archimylacridae currently comprise numerous genera and species, and would be present between the Namurian and the Triassic (see the PALEOBIOLOGY DATABASE, at https://paleobiodb.org/classic/basicTaxonInfo?taxon_no=txn:191946, consulted 25.V.2025). This family clearly needs to be completely revised to verify which genera really belong to it.

CONCLUSION

The discovery of these two new fossils, attributed to the Archimylacridae and to the phyloblattid genus *Anthracoblattina*, certainly belonging to a species different from that already studied from the same area, confirms the potential diversity of the late Carboniferous insect assemblages of the Reyran Massif. These new fossils reaffirm the paleontological potential of this Carboniferous basin and its interest in the context of the development of geoheritage concerning an UNESCO Geopark application underway for the Maures-Estérel-Tanneron Massifs ('Socle de Provence').

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