Annales de Paléontologie 102 (2016) 95–101

Disponible en ligne sur
ScienceDirect
www.sciencedirect.com

Elsevier Masson France
EM|consulte
www.em-consulte.com

Original article

Becklesia maulnyi sp. nov.: A new cycadean species from the Lower Oxfordian (Upper Jurassic) of Écommoy (Sarthe, NW France)

Becklesia maulnyi *sp. nov. : une nouvelle espèce de cycadale de l'Oxfordien Inférieur (Jurassique supérieur) d'Écommoy (Sarthe, NO France)*

Matthieu Le Couls[a,*], Jason Hilton[b], François Guillocheau[a], Nicolas Morel[c], Philippe Courville[a]

[a] *UMR, CNRS 6118 Géosciences, Université Rennes 1, Campus de Beaulieu, 263, avenue du Général-Leclerc, 35042 Rennes cedex, France*
[b] *School of Geography, Earth and Environmental Sciences, University of Birmingham, Edgbaston, Birmingham B15 2TT, UK*
[c] *Musée Vert, 204, avenue Jean-Jaurès, 72100 Le Mans, France*

ARTICLE INFO

Article history:
Received 15 April 2016
Accepted 30 May 2016
Available online 1 July 2016

Keywords:
Cycads
Becklesia
Oxfordian
Upper Jurassic
Sarthe
NW France

ABSTRACT

Plant macrofossil remains of *Becklesia* Seward, 1895 emend. Watson and Cusack, 2005, a rare genus of extinct cycad, have been known for over a century from Great Britain and Libya. Historically the genus was poorly characterized leading to many fossil cycads that resembled *Becklesia* being placed in other genera including *Cycadites* and *Paracycas*. We describe here a new species, *B. maulnyi* sp. nov., from an exceptional and almost complete cycad specimen housed for two hundred years in the collections of the Musée Vert of Le Mans. The specimen comprises the apex of a stem bearing petiolate and pinnate leaves with thin and widely separated leaflets, which possess two prominent abaxial stomatal grooves that are characteristic of the genus *Becklesia*. We reassign three other French cycad fossils previously described under different generic names to *Becklesia*. Finally, we briefly discuss the geographical and stratigraphical implications of the genus and also consider presence of entire cycads in the fossil record.

Mots clés :
Cycadales
Becklesia
Oxfordien
Jurassique supérieur
Sarthe
NO France

RÉSUMÉ

Les macrorestes de *Becklesia* Seward, 1895 emend. Watson et Cusack, 2005, un genre rare et éteint de cycadale, sont connus depuis plus d'un siècle en Grande-Bretagne et en Libye. Historiquement, ce genre à été mal caractérisé : plusieurs cycadales fossiles qui ressemblent à *Becklesia* ont été incluses dans d'autres genres comme *Cycadites* ou *Paracycas*. Nous décrivons ici une nouvelle espèce, *B. maulnyi* sp. nov., à partir d'un spécimen exceptionnel, presque complet, retrouvé dans les collections anciennes du Musée Vert du Mans. L'échantillon est constitué de l'apex d'une tige portant des feuilles pétiolées et pennées, des folioles fines et largement espacées, ainsi que deux sillons stomatiques caractéristiques du genre. Nous réattribuons également plusieurs cycadales françaises décrites précédemment sous d'autres noms au genre *Becklesia*. Enfin, nous discutons brièvement la répartition géographique et stratigraphique de ce genre, ainsi que de la présence de spécimens entiers de cycadales dans le registre fossile.

1. Introduction

The genus *Becklesia* (Seward, 1895) Watson and Cusack, 2005 was created by Seward for the rare Berriasian aged (Early Cretaceous) cycad species *Becklesia anomala* from the English Wealden. Seward's account was based on fragmentary fronds fragments that resembled those of extant cycads, but as documented by Seward, the genus was poorly characterized preventing its systematic relationships with other cycadalean plants from being determined. Watson (1969) established from the English Wealden a second species, *Becklesia sulcata*, for cycad leaf remains that include cuticular features, and Oldham (1976) identified *B. sulcata* as well as

* Corresponding author.
E-mail address: matthieu.lecouls@univ-rennes1.fr (M. Le Couls).

http://dx.doi.org/10.1016/j.annpal.2016.05.005
0753-3969/

two further species that had similarity with *B. sulcata* from isolated cuticles also from the English Wealden. However, Watson et al. (2001) transferred Oldham's additional species to the non-cycad *Torreyites detriti* leaving only *B. anomala* and *B. sulcata* within the genus. Apart from these accounts from the English Wealden, the genus *Becklesia* has only been encountered in the Jurassic of Libya with Principi (1919) reporting *B. anomala* based on its distinctive morphology.

Based on the features of *B. anomala* and *B. sulcata* Watson and Cusack (2005, p. 20) described in detail the leaf morphology and cuticle of the genus for the first time, emending the generic diagnosis as part of their monographic revision of English Wealden Cycads. They considered *Becklesia* to possess leaves with linear leaflets, which are either simple or forked, and its cuticle has haplocheilic stomata organised in two parallel, longitudinal grooves on the abaxial surface of the pinna. However, Watson and Cusack's account is based on isolated leaves from which the organisation of the leaves on the plant is unknown, as are their fertile organs.

Here, we describe a new species of *Becklesia* from the Jurassic of France based on a well-preserved specimen that represents the apex of a plant in which the leaves remain in organic attachment to the crown. We discuss the relevance of the entire nature of the crown in interpreting the plant organisation and habit. We also consider the presence of other fossil cycads in which well-preserved crowns are known from other stratigraphical intervals as well as the palaeogeographical and stratigraphical implications of the new species.

2. Material and methods

The sample MHNLM 2003.1.4962 studied here is housed in Musée Vert, natural history museum of Le Mans (Sarthe, NW France). The oldest label joined to the specimen (Fig. 1) indicates that it belonged to the "Cabinet de Maulny". Louis Maulny (1758–1815) was a naturalist of Le Mans, whose collection was bought by the museum of Le Mans after his death in 1816 (Delaunay, 1945). This first label has been written by Narcisse Desportes (1776–1856), curator of the museum between 1833 and 1856. It indicates with doubt the genus *Zamia* and the collection site in Écommoy (Sarthe, NW France) (Fig. 2). Two other labels on the specimen were written at the end of the 19th century and during the first part of the 20th century have copied the previous label and added no further information.

The unusual sediment of the studied specimen has been compared with the palaeontological collections housed in the Musée Vert in order to provide further information on its provenance. An ammonite (MHNLM 2003.1.4686) collected a few decades later (June 29, 1852) by the local palaeontologist Edouard Guéranger

Fig. 1. First label of *Becklesia maulnyi* sp. nov.
Premier cartouche de Becklesia maulnyi *sp. nov.*

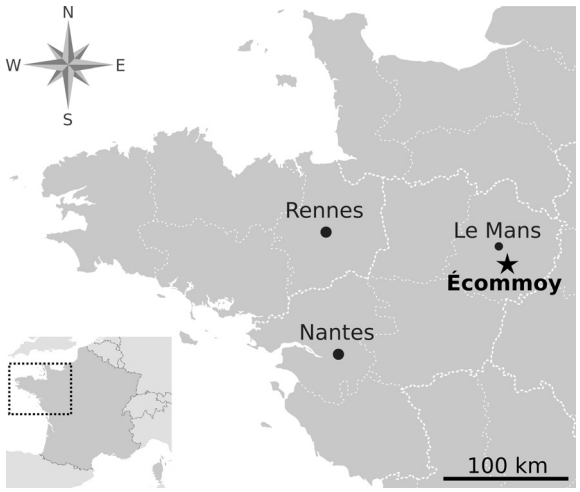

Fig. 2. Position of Écommoy on a simplified map of northwestern France.
Emplacement d'Écommoy sur une carte simplifiée du nord-ouest de la France.

(1801–1895) from Écommoy is preserved in a very similar rock matrix. It probably confirms the geographical origin written by Desportes and also helps to constrain the geological age.

The sediment for both the fossil plant and ammonite is a fine sandy and argillaceous, bicoloured, yellow and grey limestone. This fine grained sedimentary facies has preserved the mold of the fossil plant including grooves on the leaves but lacks cuticular preservation. This rock corresponds to the "Marnes et calcaires silteux de La Vacherie" [marl and silty limestone of La Vacherie], a local formation with terrestrial influence form the Lower Oxfordian aged *Mariae* zone and *Praecordatum* subzone (Manivit et al., 1988). Moreover, the ammonite is an unnamed small *Kranaosphinctes* that supports a Lower Oxfordian age corresponding with the end of the *Scarburgense* subzone to the beginning of the *Praecordatum* subzone. In addition, a Cardioceratidae sampled by one of us (P.C.) a few years ago clearly indicate the *Praecordatum* subzone.

The exact location(s) of the outcrop where either the plant or ammonite was collected are unknown. However, following the first geological study of the Bélinois by Guillier (1875), two quarries were evident in the region, namely "La Vacherie" and "l'Épine". These two quarries were approximately 1.5 km apart and both are now back filled. There are no Oxfordian aged outcrops in the Bélinois area today. However, a stratigraphic column of "La Vacherie" is provided by Guillier (1886, p. 178).

Specimen MHNLM 2003.1.4962 is an imprint of the lower face of a crown of leaves viewed from above and is preserved among poorly-preserved marine shelly fauna (Fig. 3A). It is also an outcast molding with relief and micro-relief able to preserve some architectural features. All the leaves are incomplete apically, but the lower-mid parts are more or less entire and are connected to the apex of the stem to form the crown (Fig. 3A). Five leaves are preserved; two of them bifurcate close to the insertion point with the crown. Small areas of a few of the leaflets are still covered by sediment protecting small and fragile carbonaceous remains that may be fusinized. They can perhaps in the future provide new details at cellular scale with an appropriate non-destructive method capable of studying these fragile remains *in situ*. Others small and unidentifiable plants fragments are also present on the sample.

The specimen was observed using a Leica EZ4 binocular microscope and macrophotography was undertaken using a Canon EOS700D with Canon EF-S60 mm F2.8 Macro USM lens. Moreover, a petrological thin section (30 μm thick) was made from sample 2003.1.4962 to better characterize the geological context; it is housed in Musée Vert of Le Mans with the number MHNLM 2003.1.4962b.