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# XIX International Botanical Congress

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## First occurrence of Icacinaceae fossil flower in amber of Le Quesnoy site (Ypresian, France)

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### I. Introduction

Flowers preserved in amber are rare. In particular, the lamiid clade is represented by only one occurrence (Gentianales) in the Paleogene. Nevertheless, the exceptional preservation of these fragile structures and organs which are usually not preserved in other sediments or deposits, makes these fossils important for understanding evolutionary processes and past diversity. The locality at Le Quesnoy (Houdancourt, Oise, France) was first exploited in 1999 (Net et al. 1999). This first survey highlighted the abundance of insects and the presence of at least one flower of caesalpinoid legumes in amber. Here, we studied a flower from this site and discussed its systematic affinities.

### II. Material & methods

**Material:** The remains of fossil resin were collected from 1997 to 2000 from the lignitic clay sediments at Le Quesnoy (Houdancourt, Oise, France) which belong to the « argiles à lignites du Soissonais » Formation. These sediments are dated from the Ypresian ( $\pm 56$  Ma) according to mammal biochronology (MP7) and palynological studies. The pollen included in the amber on the petals hairs was studied using a technique of extraction (De Franceschi et al. 2000).

The fossils are kept in the collections of the Muséum national d'Histoire naturelle (MNHN, Paris).

**Phylogenetic analysis:** A morphological matrix containing 51 taxa and 22 characters was made and added to a previous molecular matrix with 73 protein-coding genes (Stull et al. 2015). Bayesian analyses were performed using MrBayes from a mixed format with two partitions (5 million generations, sampling every 1000 generations, 20% burn-in).

### III. Results & discussion

**Flower description:** Actinomorphic, hypogynous and pentamerous,  $\varnothing$  2.5 mm, cupulate calyx. Petals fused at the base in a short cup (Fig. 1), tomentose on adaxial surface with long, simple flattened hairs with granular ornamentation (Fig. 2AB), glabrous on abaxial surface. Stamens alternate to petals and free. Pollen small, triaperturate and echinate (Fig. 1D-F). The ovary seems to be poorly developed or very small.

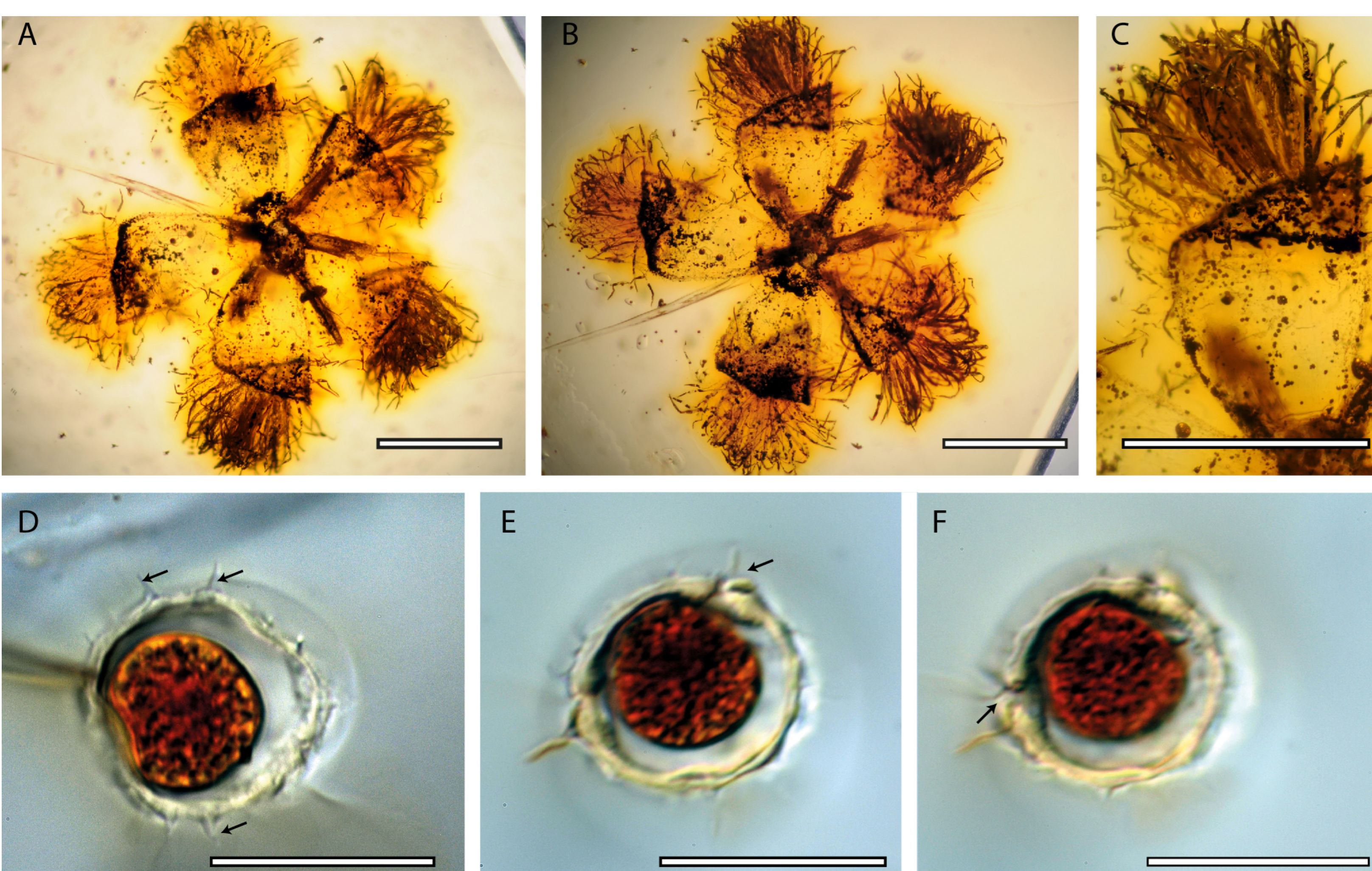


Figure 1: Flower from Le Quesnoy site. A: flower in apical view with petals curved backwards; B: same in basal view; C: detail of petals in basal view; D: pollen grain showing echinate ornamentation (arrows); E-F: other pollen grain showing pores (arrows). Scales: A-C = 1mm, D-F = 20  $\mu$ m.

**Phylogenetic analysis:** The 50% majority-rule consensus tree of Bayesian analysis was conducted (Fig. 3). This flower belongs to Icacinaceae family. The presence of tomentose and ribbon-like hairs (Fig. 2A-B) with granulate ornamentation confirm the phylogenetic relationship (Fig. 2A-D). The porate pollen and the cupular calyx assimilate this flower to the Clade III and IV (Fig. 3). The presence or the absence of hairs adaxially and abaxially on petals are responsible to the uncertain position of the flower between *Hosiea* and *Natsiatum*. (Fig. 3).

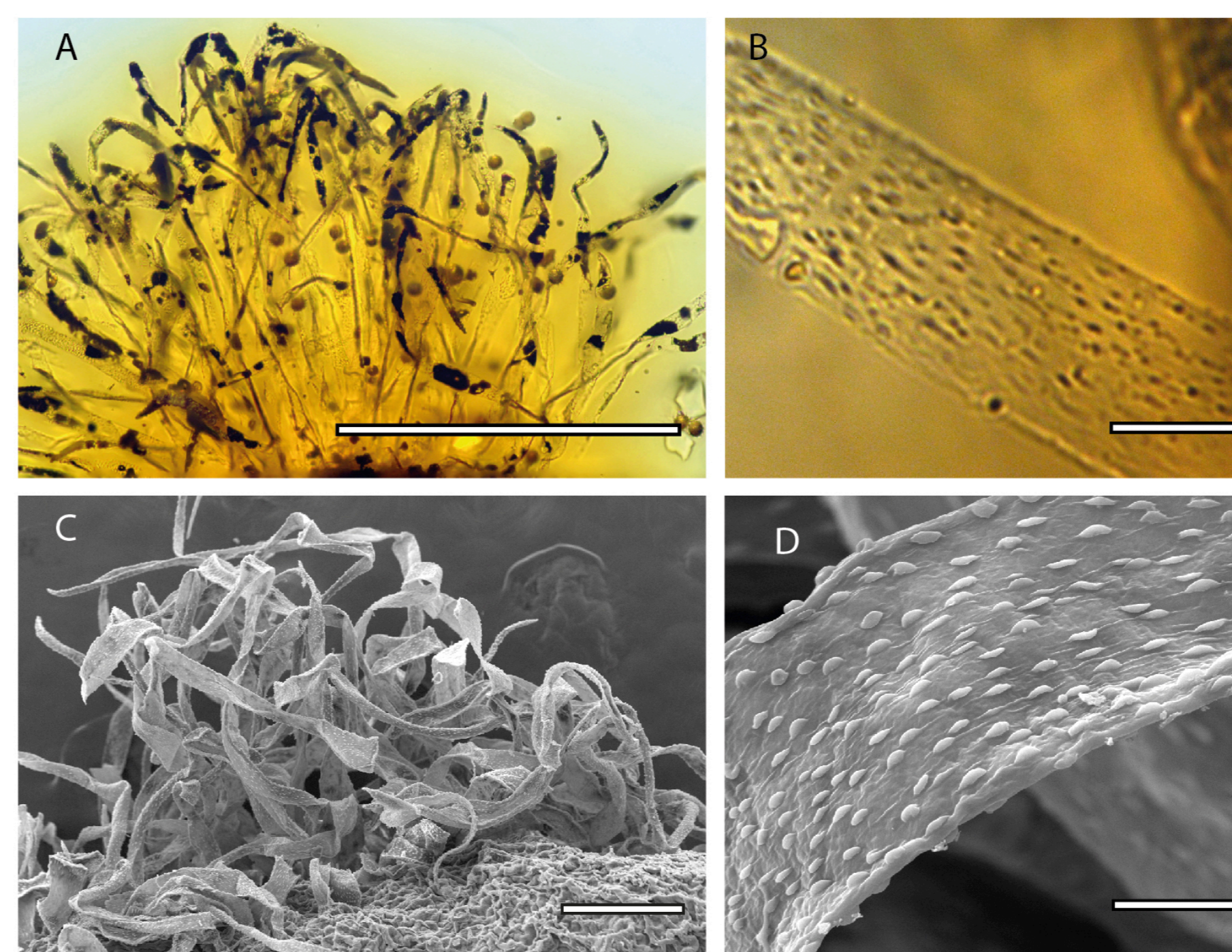
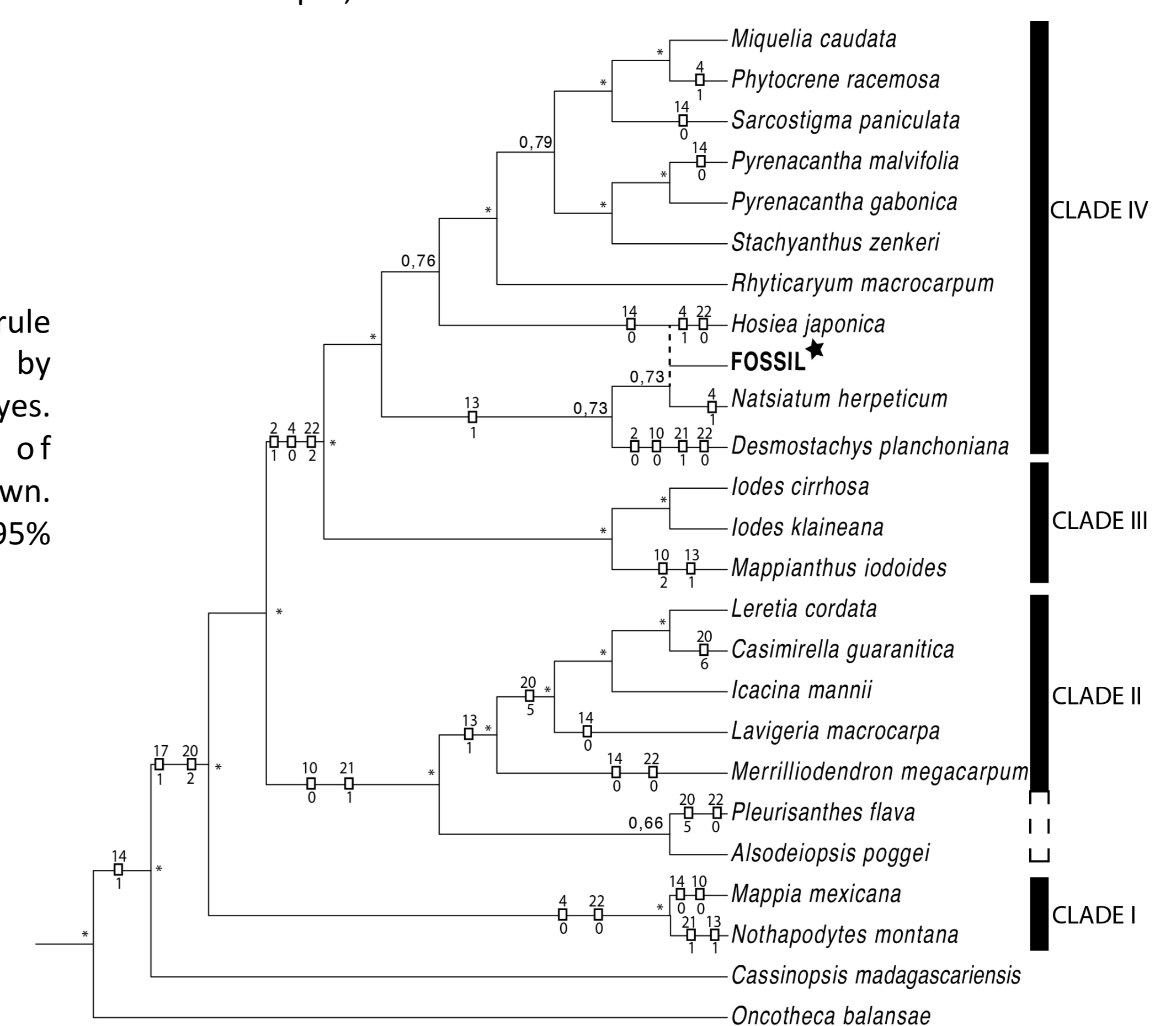


Figure 2. Petal hairs. A-B: On petals from fossil flower; C-D: on petals from a modern flower of *Icacina mannii* Oliv. Scales: A= 500  $\mu$ m, C= 100  $\mu$ m B&D=20  $\mu$ m.

### IV. Conclusions

*Natsiatum* and *Hosiea* are Asian climbing shrubs genera. Thus we hypothesize that this flower fossil belongs to a climbing shrubs. This type of ecology is frequent for megathermal flora that could have occurred in Europe during the early Eocene global warming phase as seen in other locality (Collinson et al. 2012; Reid & Chandler 1933). Therefore, this flower could testify to an Asian affinity for Le Quesnoy Ypresian flora.

Figure 3. The 50% majority-rule consensus tree constructed by Bayesian inference in MrBayes. Mesquite orientation of pertinent characters is shown. (\*) represent strong node (>95% PP).



### V. Acknowledgements

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