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The Reiteration of the Miniaturised Model in some Complex Inflorescences

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Abstract

The complex inflorescence of *Calathea lutea* (AUBL.) SPRENG. *(Marantaceae)* consists of 2 or 3 bundles of spike-like partial inflorescences. In this complex inflorescence, the branching pattern of the drepanium occurs of two different levels: in each bundle the spike-like inflorescences are arranged in a drepanium and in the lower part of each spike-like partial inflorescence dyads are arranged in drepania. Inflorescences of comparable complexity are observed among the *Euphorbiaceae*, *Poaceae* and *Asteraceae*. It turns out that in these reputedly highly specialized families, the basic flowering unit, once it has undergone evolutionary processes of simplification, reduction and contraction, appears in the form of a miniaturised model, the architectural structure of which is then reiterated throughout the flower bearing ramification system of the plant.

Key-words: inflorescences, miniaturised model, reiteration, *Marantaceae*

family, that the morphology of the flowering unit and consequently, of the main inflorescence, could be interpreted differently according to whether one adopted a purely typological standpoint or a biological and phylogenetic one. More generally speaking, it is the case for taxa which have reached a high level of evolution in Angiosperms.

This point will not be discussed in this paper; it will be developed in a forthcoming

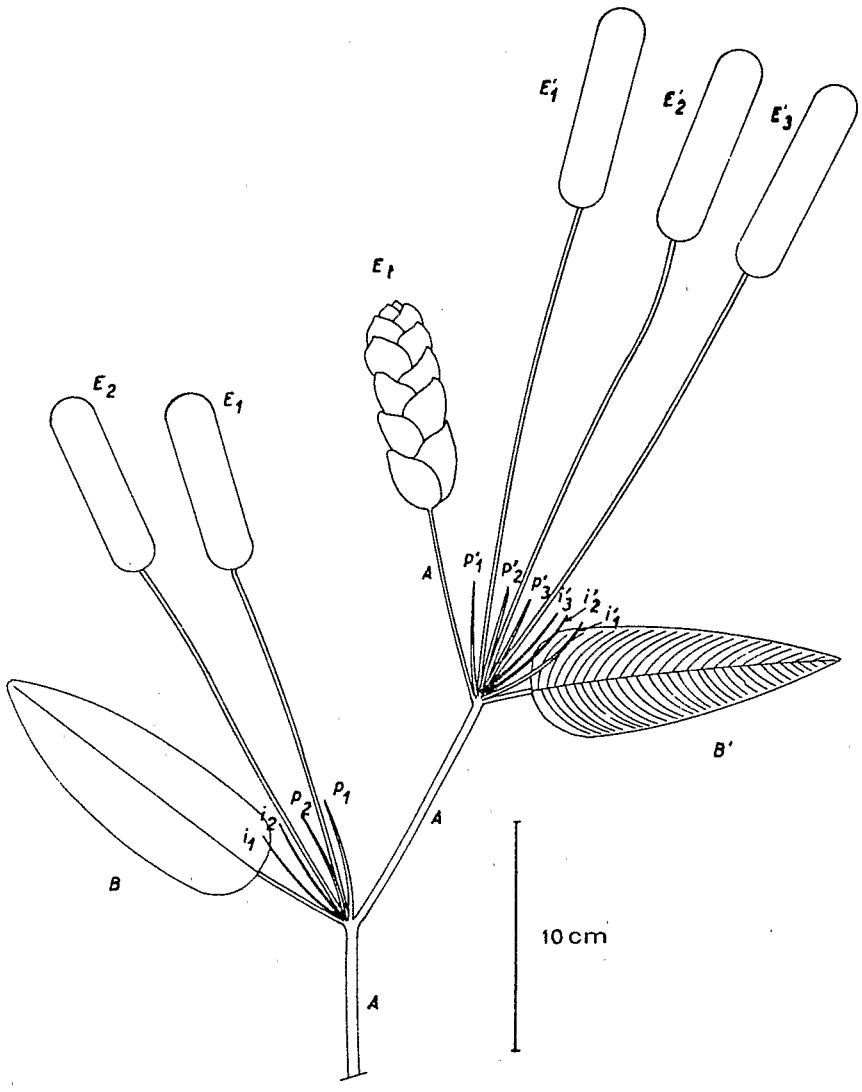

Fig. 1. Half-schematic representation of the inflorescential complex of *Calathea lutea* (AUBL.) SPRENG. Et = terminal spike-like inflorescence; E1, E2, E'1, E'2, E'3 = spike-like inflorescences; p1, p2, p'1, p'2, p'3 = prophylls; i1, i2, i'1, i'2, i'3 = interphylls; B, B' = bracts; A = main axis.

extremely short, virtually non existing. The inflorescence axis itself is crowned by a terminal

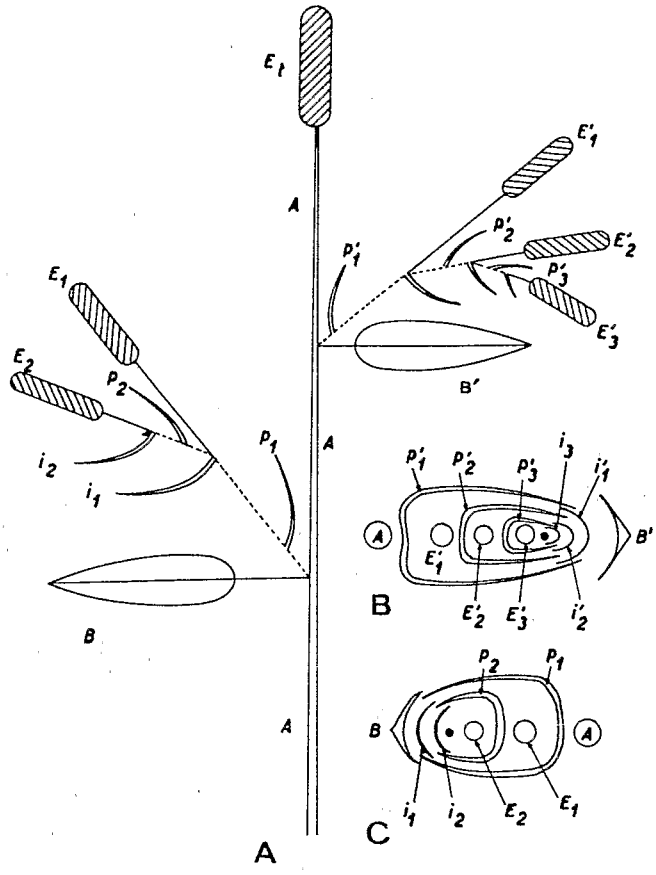

Fig. 2. Schematic representation of the inflorescence complex and diagrams of the 2 bundles of spike-like inflorescences of *Calathea lutea* (AUBL.) SPRENG.
Dotted lines show the non-elongated parts of the axes; same symbols as for Fig. 1.

The interpretation of such a dyad (Fig. 3D), which is still subject to controversy will not be dealt with here. We shall nevertheless adopt the interpretation of KUNZE (1985) who confers on the dyad the value of an indeterminate biflorous spike which we shall call a spikelet (Fig. 3E and 3F). Triflorous spikelets were observed in *Calathea lutea* (Fig. 3B). Towards the tip of the spike-like inflorescence, the dyads are single in the axil of each bract on the main axis, whereas proximally they occur in twos or fours, arranged in a drepanium, with an extremely short axis (Fig. 3C). As previously, each ramification emerges from an interphyll; thus such a drepanium again constitutes a racemose inflorescence. The spike-like inflorescence of *Calathea lutea* has no terminal dyad, whereas one is present in other species of *Marantaceae* (e.g. *Maranta leuconeura* E. MORR.). Thus, in *Calathea lutea*, a spike-like inflorescence as drawn in figure 3A corresponds to an indeterminate (or polytelic) compound raceme of drepania composed of dyads, which displays a paniculate structure. Thus within each of these compound racemes, we again encounter the structural scheme of each bundle of spike-like inflorescences of the inflorescence complex. The diagrams in figures 2 (B and C) and 3C are indeed quite comparable: one has merely to replace the biflorous spikelets of figure 3C by spike-like inflorescences to obtain the pictures shown in figures 2B or 2C.

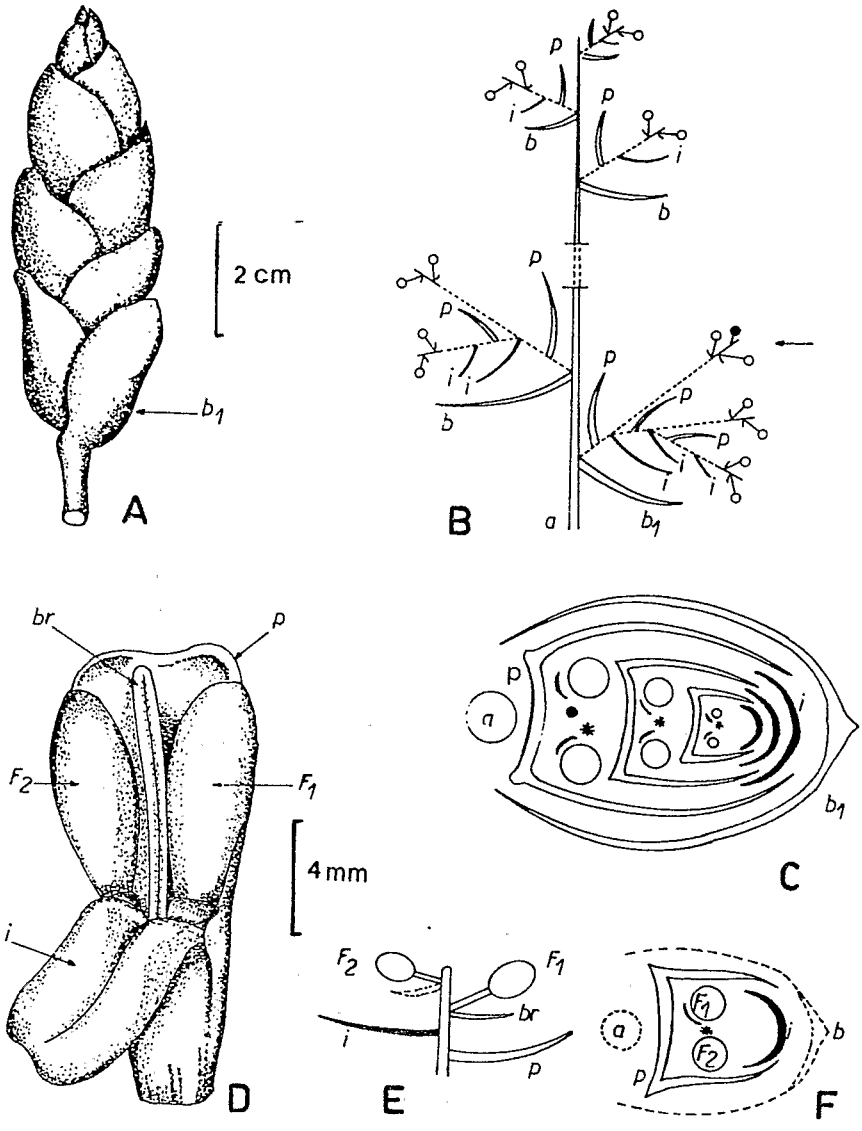

Fig. 3. *Calathea lutea* (AUBL.) SPRENG.
A. A spike-like inflorescence.
B. Scheme of this inflorescence which is in fact a compound raceme of biflorous spikelets. Unshown part of the axis is dotted; arrow shows a spikelet with 3 flowers.
C. Diagram of the whole borne by b1.
D. A dyad.
E. Scheme of dyad shown in 3D.
F. Diagram of dyad: dotted, the main axis of the spike-like inflorescence (a) and the bract (b) not shown in E.
b, b1 = bracts; p = prophylls; i = interphylls; F1, F2 = flowers; br = bracteoles.

The whole inflorescence of *Calathea lutea* thus displays a highly complex structure since it corresponds to a compound raceme (Fig. 2A) of compound racemes (Fig. 2B) of biflorous

No one would question that the head constitutes the flowering unit of the *Asteraceae*. In certain species, this simple inflorescence, which constitutes the miniaturised model, is reiterated in the form of a raceme or of a spike of heads, with a terminal head, and therefore determinate (*Liatris spicata* (L.) WILLD.) or without one, therefore indeterminate (*Ligularia wilsoniana* (HEMSL.) GREENM.). A further process of contraction then leads to a head of heads (syncephalium) of *Myriocephalus gracilis* BENTH. and of *Syncephalantha decipiens* BARTL. (see WEBERLING 1981, pp. 318 and 321).

Conclusions

These few examples of species belonging to families reputed to be highly specialised, testify that an inflorescence structure which has, so to speak, reached an advanced state in its evolution in the form of a miniaturised model (drepanium of *Calathea*, cyathium of

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