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THE TAXONOMIC POSITION OF PAPUODENDRON C.T. WHITE AS ELUCIDATED BY ANATOMICAL CHARACTERS

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When, in 1946, White described *Papuodendron lepidotum* from New Guinea, he apparently hesitated to incorporate this species in the Bombacaceae. He considered that whereas on the one hand the congestion of the stamens on top of the stamen tube pointed to Bombacaceae, on the other hand the absence, of tile cells in the rays indicated the Hibisceae. Van Steenis (1947), in an enumeration, listed *Papuodendron* under the Bombacaceae. However, Kostermans (1960) decided that *Papuodendron* was Malvaceous, that it most probably belonged in *Hibiscus,* with affinity to a small group of New Guinean species, namely *Hibiscus carrii, H. womersleyanus* and *H. pulvinulifer,* which were all described by van Borssum Waalkes (1956). It was the opinion of Kostermans (1960) that the congestion of the stamens on top of the tube was insufficient for separating *Papuodendron* from *Hibiscus,* in which genus the stamens are spread along the distal part of the tube. Accordingly Kostermans reduced *Papuodendron* to *Hibiscus,* and renamed *Papuodendron lepidotum* White as *Hibiscus papuodendron* Kosterm. In addition Kostermans described a second *'Papuodendron'* species, *Hibiscus hooglandianus.* The discussion of van Borssum Waalkes (1966) on the problem appears contradictory. Whereas on the one hand he claimed that *Papuodendron* is at any rate a link between the Hibisceae and the Durioneae, he stated on the other hand that *Papuodendron* resembles very much *Hibiscus pidvinulifer.* He rejected the names of Kostermans, reestablishing *Papuodendron,* and did not treat the genus in his revision of Malesian Malvaceae.

In the following I shall bring forward a number of anatomical arguments, in three stages, in favour of the view of Kostermans in this **matter.**

1. Papuodendron is Malvaceous

As I explained in 1966, the stamens in Malvaceae and many Bombacaceae are arranged along the free distal parts of five lobes that are fused with their bases into a tube. These staminate lobes consist of a median and two lateral parts, each part with its own vascular bundle supply. However, whereas in Malvaceae the, median part and its vascular supply is reduced or almost so, in Bombacaceae this part is either staminiferous or staminodial, and shows a corresponding vascular bundle supply. In this respect *Papuodendron* follows the Malvaceous structure.

Another argument is derived from the structure of the pollen. As noticed by several authors the pollen of *Papuodendron* are echinate, as is the rule in Malvaceae. However, it is important to add that the pollen are periporate, meaning that many simple pores are spread all over the surface of the pollen grain. Whereas this particular structure is prevalent in Malvaceae, it is absent in Bombacaceae. It is conceivable that together these two pollen characters could greatly serve to delimit Malvaceae and Bombacaceae.

2. Papuodendron belongs to the Hibisceae

Accepted as Malvaceous, the genus finds its place in the Hibisceae. This is evident from general habit, as well as from the capsular fruits, the free capitate stigmata, and such special features as the stamens being divided serially, not collaterally. For these reasons *Papuodendron* must be placed in the Hibisceae, preferably like redefined by Fryxell (1968).

3. Papuodendron is a Hibiscus species

In *Hibiscus* the, monothecous anthers show a characteristic vascular bundle supply, consisting of a dichotomy of two sharply anatropous branches that leave some residual tissue in the branch angle. This precise pattern neither occurs in Bombacaceae nor in other genera of Malvaceae, except for the dissimilar eastern-European *Kitaibelia vitifolia*. *Papuodendron* does show this pattern.

The second argument is the resemblance of *Papuodendron* with a small group of New Guinean *Hibiscus* species, as mentioned above. This concerns general appearance (indumentum, inflorescence) as well as two noteworthy special characters. Firstly all the *Hibiscus* spp. under consideration belong to a part of the section *Azanza* that shows five radial false septs in the ovary cells, creating the appearance of ten cells.

Papuodendron also shows these false septs. Secondly *Hibiscus pulvinulifer* possesses large, profusely vascularised, glands where the petals are attached to the stamen tube. These glands are, obscured by long surrounding hairs. In the whole of Bombacaceae and Malvaceae these antepetalous glands are restricted to *Hibiscus pulvinulifer* and *Hibiscus sciadolepidus* (Hochr.)Borss., a species equally belongs to the *Azanza* section. However, also *Papuodendron* shows this peculiar feature.

One single character remains against reducing *Papuodendron* to *Hibiscus,* namely the position of the stamens together on the summit of the stamen tube, instead of spread along the distal part of the tube. Moreover the sterile extension of the tube, as present in *Hibiscus,* is lacking in *Papuodendron.* Kostermans thought that a slight difference in length of the filament could be of no value. To that may be added that in young flowers of *Hibiscus hooglandianus* — the second *'Papuodendron'* species — I noticed sterile lobes at the end of the tube. However, I am not certain that these young lobes will be visible in mature flowers. Also, in these young flowers, the stamens were slightly spread along the distal part of the tube. However that may be, more relevant is that also in *Hibiscus pulvinulifer* a sterile tube ending is absent, and that the stamens are rather closely packed along the distal part of the tube.

Thus a close affinity of *Papuodendron* to this group of New Guinean *Hibiscus* species in the *Azanza* section is firmly established, especially to *Hibiscus pulvinulifer.* For some common special features in the receptacular vascular bundle pattern I may refer the reader to my paper of 1966; these features indicate a similar way of development of that region.

The conclusion is that the reduction of *Papuodendron* to *Hibiscus,* as proposed by Kostermans, is fully corroborated by anatomical study.

I dedicate this paper to Dr. A. J. G. H. Kostermans, on the occasion of his 65th anniversary. What else could the anatomist add but some security to what is grasped at once by the able tropical botanist?

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