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THE “FOREST FLOOR” SAPROPHYTES *VOYRIA SPRUCEANA* AND *V. APHYLLA* (GENTIANACEAE) GROWING AS EPIPHYTES IN COLOMBIAN AMAZONIA

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During fieldwork on vascular epiphytes we recorded *Voyria spruceana* Benth. and *Voyria aphylla* (Jacquin) Persoon (Gentianaceae) growing at up to 30 m high on trees. The forest concerned is a wet tropical lowland forest on Tertiary river sediment. This *tierra firme* forest is situated at 72°05'W, 0°39'S in the Middle Caquetá area, Colombian Amazonia (elevation ± 180 m). The annual rainfall exceeds 3000 mm and mean annual temperature is 25.7°C (Duivenvoorden & Lips 1993). In total, 59 individuals were found on four full-grown trees, standing closely together, of three different species: two *Buchenavia* sp. (Combretaceae), one *Mezilaurus* sp. (Lauraceae), and a *Couratari* sp. (Lecythidaceae). Unfortunately, because of the morphological similarity between the two *Voyria* species, we were not able to distinguish them in the field. Identifications were made on collected specimens.

The height above the ground varied from about 10 up to 30 m (Table 1). Most of the saprophytes were seen somewhat below or within the inner crown of the trees. When found in the outer crown, growing sites were shaded. Often the substrate was a vertical moss mat on the trunk. Occasionally they were found in humus deposits in root systems of Araceae, and a few individuals grew in cracks of phorophyte bark (Fig. 1). A number of individuals bore dehisced dry fruits. The two species were not encountered on the forest floor near the phorophytes.



FIG. 1. One of the two *Voyria* spp. growing epiphytically in a crack of *Couratari* sp. bark.

TABLE 1. Number of individuals of *V. spruceana* and *V. aphylla* on height zones of two meters and, simultaneously, on tree zones (defined after Johansson (1974)) of the phorophytes. TB = trunk base (0–2m); MT = middle trunk (up to tree crown); IC = inner crown (trunk above MT and basal 3m of branches); OC = outer crown (outer end of branches from 3m to twig ends).

Height	<i>Buchenavia</i> sp. #1	<i>Buchenavia</i> sp. #2	<i>Couratari</i> sp.	<i>Mezilaurus</i> sp.
10–12 m	–	12	–	–
12–14 m	–	1	–	–
14–16 m	–	–	–	–
16–18 m	7	–	–	17
18–20 m	–	–	–	–
20–22 m	–	–	–	3
22–24 m	4	–	–	–
24–26 m	3	–	–	–
26–28 m	5	–	–	–
28–30 m	–	–	7	–

tree zone				
TB	–	–	–	–
MT	–	13	–	–
IC	13	–	7	20
OC	6	–	–	–

Voyria species were known to grow on forest floors only (Maas & Ruyters 1986, Imhof *et al.* 1994). One species of *Voyria* is mentioned in the list of epiphyte taxa made by Kress (1986), but this seems unreliable and may refer to the fact that *Voyria* is sometimes found growing on dead logs and on the base of tree trunks.

The seeds of *Voyria* are all considered to be of the dust type (Bouman & Devente 1986). Only four species of this genus have seeds that strongly suggest anemochory: filiform to fusiform seeds, which form plume-like structures together with the so-called paraphyses (developing from abortive ovules). These species form the *V. aphylla* seed group (Bouman & Devente 1986). *V. aphylla* is a species of various forest types, and commonly found in relatively open sites, e.g., savannas (Maas & Ruyters 1986). This species occasionally grows on decaying logs and living trunks up to three meters above the ground (P. J. M. Maas, pers. comm.; Richards 1996). Therefore one would expect epiphytism in *V. aphylla*, but so far this species has never been recorded in the canopy.

V. spruceana has ovoid seeds of about 250 µm long, without appendages. It was assigned to the *V. tenuiflora* group by Bouman & Devente (1986). The commonest seed dispersal mode is rather obscure. Rain-wash, as suggested by Bouman &

Devente (1986), applies to downward dispersal along the tree trunks, and to dispersal over the forest floor. The same goes for possible myrmecochory by leaf-cutting ants, as observed in *V. tenella* and *V. truncata* by Imhof *et al.* (1994). Air currents are probably able to transport the dust seeds upward, and to disperse seeds within the canopy. "Accidental" dispersal, e.g., epizoochory by small mammals or birds, could also have caused the colonization of the canopy by this saprophyte.

Our observations indicate that the seeds not only of *Voyria aphylla* but also of *V. spruceana* may be dispersed by wind and that both are capable of reaching the canopy and maintaining a population. This may also be the case for other species of the *V. tenuiflora* and *V. aphylla* groups. Epiphytic occurrence of several *Voyria* species is probably more common than known at present since the canopy still remains under-investigated. On the other hand, tree crowns of lowland rain forest plots in Guyana and French Guiana did not carry populations of *Voyria*, while several species (e.g., *V. aphylla*) did occur on the forest floor (H. Maas, H. ter Steege and R. Ek, pers. comm.). Therefore, and because of their saprophytic nature, it does not seem likely that the number and sizes of canopy populations of *Voyria* species are comparable to those found on the floor. However,

we predict that especially species of the *V. tenuiflora* and *V. aphylla* groups will be found in the canopy during future canopy field studies.

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