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Mode of Secretion in the Colleters of *Alstonia scholaris (Apocynaceae)*

By

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With 1 Figure

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Summary

THOMAS V. & DAVE Y. 1990. Mode of secretion in the colleters of *Alstonia scholaris (Apocynaceae).* – Phyton (Horn, Austria) 30 (1): 209–212, 1 figure. – English with German summary.

In *Alstonia scholaris (Apocynaceae)* colleters are present on the adaxial base of the petiole and calyx. Structurally a colleter consists of a central core of parenchyma cells surrounded by radially elongated epithelial cells. Some of the central cells beneath the epithelial cells swell due to the accumulation of secretory material. These cells enlarge due to more accumulation and create an outward force leading to the rupture and displacement of both central and epithelial cells. Colleter exudate shows the presence of sugar rhamnose. But amino acids are not identified.

Zusammenfassung

THOMAS V. & DAVE Y. 1990. Der Sekretionsvorgang in den Colleteren von *Alstonia scholaris (Apocynaceae).* – Phyton (Horn, Austria) 30 (1): 209–212, 1 Abbildung. – Englisch mit deutscher Zusammenfassung.

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Alstonia scholaris (Apocynaceae) besitzt Colleteren an den adaxialen Basen des Blattstiels und des Kelches. Eine Colletere besteht aus einem zentralen Kern porenchymatischer Zellen, die von radial gestreckten Epithelzellen umgeben sind. Einige der unter den Epithelzellen liegenden Parenchymzellen schwellen durch Akkumulation von Sekretmaterial an. Durch den anwachsenden Druck nach außen kommt es unter Verlagerung der Zentral- wie der Epithelzellen zum Platzen. Das Exsudat enthält Rhamnose, Aminosäuren wurden nicht gefunden.

Introduction

Alstonia scholaris (Apocynaceae) is a tree having whorled phyllotaxy with colleters on the adaxial base of the petiole and calyx (THOMAS & DAVE 1989a). Colleters secrete a highly viscous fluid, which is coming out on rupture of the cuticle (DAVE & al. 1988) or through the gap present inbetween the epithelial cells (LERSTEN & CURTIS 1974, THOMAS & DAVE 1989b). But it is found that the mode of colleter secretion in *Alstonia* is peculiarly different from the colleters of the members of the families *Rhizophoraceae, Rubiaceae, Apocynaceae* and *Asclepiadaceae* (DAVE & al. 1987; KURIACHEN & DAVE 1989).

Materials and Methods

Shoot tips of *Alstonia scholaris* are collected in summer and winter from two geographically different places; University Botanical Garden (Gujarat) and Cochin (Kerala). Collected samples are fixed in F.A.A. and embedded in 'tissue prep' after dehydration through a graded series of tertiary butyl alcohol. Serial sections of 6–8 µm thickness are cut and stained with safranin-fast green. Observations and photomicrographs are made by Carl-Zeiss microscope.

Secretion of the colleter dissolved in 80% ethyl alcohol is centrifuged at 3000 rpm for 30 min. and the supernatant is centrifuged at 40–50° C. Thin layer chromatography is carried out on silica gel plates using the solvents n-butanol, acetic acid, water: 4/1/5 v/v, and 8/8/2 v/v for sugars and for aminoacids respectively. Aniline diphenyl amino reagent is sprayed for the detection of sugars and the ninhydrin test (PLUMMER 1982) is performed for aminoacids.

Results and Discussion

A detailed structural, developmental and histochemical study of colleters of *Alstonia* has been performed by THOMAS & DAVE 1989a. Each colleter is a finger shaped structure, consisting of a central core of parenchyma cells, surrounded by radially elongated epithelial cells. Histochemical study reveals the presence of starch, protein and lipid in the colleter tissue. Freshly harvested exudate of *Alstonia* colleter shows the presence of sugar rhamnose. But amino acids are not identified. Sugars identified in the secretion of different genera also vary: only rhamnose is present in both *Aganosoma* (DAVE & al. 1987) and in *Roupelia* (THOMAS & al. 1989), both glucose and rhamnose in *Allamanda* (THOMAS & DAVE 1989b).

The chief function of the colleter is to protect the developing meristem by secreting a colourless or pale yellow viscous fluid (MUELLER 1985, THOMAS & al. 1989, cf. NETOLITZKY 1932). It is found that colleters are more active during winter. The oozing of the secretion occurs by rupture of the cuticle or through the gap present inbetween the epithelial cells. This is the common phenomenon in colleters. But in *Alstonia,* the exudation from the

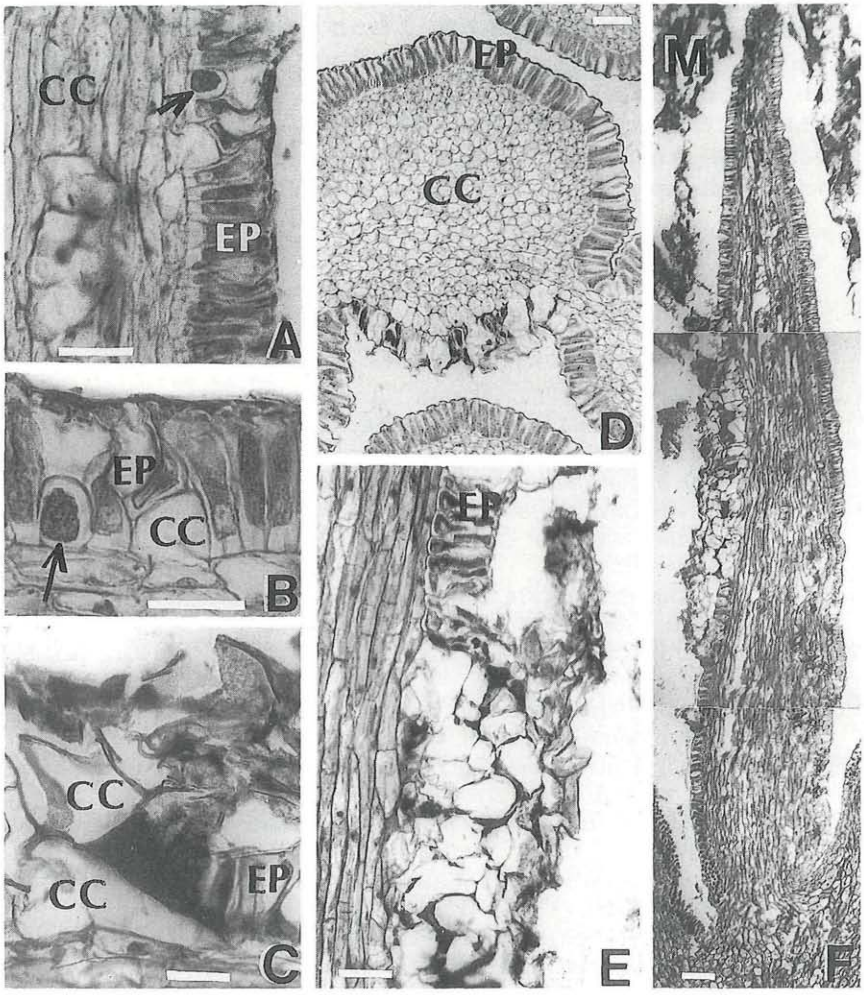

Fig. 1. *Alstonia scholaris.* A, B: Longitudinal section of colleter showing displacement of central cells (at arrow) due to the accumulation of secretory material. – C, D, E: Discharge of epithelial cells by the rupturing of epithelial and central cells. – F: Longitudinal section of a colleter after seretion. Secretory material (M) can be seen around the colleter. – CC = central cells, EP = epithelial cells; M = secretory material; index bar = 50 μm.

colleter tissue is found to be peculiar. Some of the central cells beneath the epithelial layer swell due to the accumulation of secretory material (Fig. 1A–B). This is observed in the colleter on the petiole of the 3rd of 4th node from the the apex. Due to the accumulation of more material, these cells bulge again and create an outward force leading to the rupture and displacement of both central and epithelial cells (Fig. 1C–D). Rupturing of the cells is found more on the adaxial side of the colleter, which is facing towards the meristem (Fig. 1D–F).

In the glandular hairs of yarrow *(Achillea millefolium)* the cuticle bursts open and the whole hair degenerates after a single act of secretion (see MARTIN & JUNIPER 1970). As in *Achillea,* the entire degeneration of glandular hair is not observed in the colleters of *Alstonia;* but a part of the structure is disturbed, which is so far not reported in any colleters.

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