

## The Chemistry of Brazilian Lauraceae. XLVII. Ferulic esters from *Endlicheria* and *Ocotea* species

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A specimen from the Torquato-Tapajós Highway, km 133, Amazonas, voucher Herbarium INPA 48255, was identified tentatively with *Endlicheria anomala* Nees (Lauraceae) by Dr. W. A. Rodrigues. A trunk wood sample (1.2 kg) was extracted with ethanol. The chloroform-benzene 1:1 soluble part (15 g) of the extract (38 g) was chromatographed on a silica (360 g) column. Elution with C<sub>6</sub>H<sub>6</sub> gave, in order, fatty ester (2 g, oil), n-tetracosyl ferulate [347 mg, mp 65-67° (C<sub>6</sub>H<sub>6</sub>)], n-tetracosanol [93 mg, 71-73° (C<sub>6</sub>H<sub>6</sub>)] and sitosterol [1230 mg, 138-140° (EtOH)]. Elution with C<sub>6</sub>H<sub>6</sub>-CHCl<sub>3</sub> 9:1, C<sub>6</sub>H<sub>6</sub>-CHCl<sub>3</sub> 8:2 to 0:10, CHCl<sub>3</sub>-AcOEt 9:1 and AcOEt-MeOH 9:1 gave respectively stearic acid [70 mg, mp 68-69° (C<sub>6</sub>H<sub>6</sub>-EtOH)], a stearate of a fatty alcohol [58 mg, mp 86-88° (EtOH-CHCl<sub>3</sub>)], a ferulate of a fatty alcohol [90 mg, mp 77-78° (EtOH-CHCl<sub>3</sub>)] and a glycoside [28 mg, mp 291-293° (EtOH-CHCl<sub>3</sub>)].

n-Tetracosyl ferulate was identified by spectral data (IR, <sup>1</sup>H NMR, MS) and direct comparison with an authentic sample [Franca *et al.*, 1975]. n-Tetracosanol was identified by direct comparison with the alcohol obtained by saponification of the ferulate. Sitosterol and stearic acid were identified by direct

comparison with authentic samples. Saponification of the additional esters, mp 86-88° and 77-78°, gave respectively stearic acid, mp. 69-70°, and ferulic acid, 169-170°.

The simplicity of composition of *E. anomala* contrasts with the diversity and complexity of cinnamate derived metabolites of Lauraceae species described in all previous reports of the present series [for part XLVI see Diaz *et al.*, 1977]. In this respect, the species, nevertheless, does not occupy a peculiar position. Absence of detectable quantities of cinnamate derived metabolites and accumulation of ferulic acid was noted additionally for the following species.

*Ocotea canaliculata* Mez from the Manaus-Itacoatiara Highway, km 140, Amazonas, cf. voucher Herbarium INPA 16896, identified by Dr. W. A. Rodrigues.

*O. guianensis* Aubl. from the Manaus-Ponta Negra Road, Amazonas, voucher Herbarium INPA 50121, identified by B. Albuquerque.

*O. neesiana* (Miq.) Kosterm. from the Manaus-Itacoara Highway, km 69, voucher Herbarium INPA, Manaus 47243, identified by Dr. W. A. Rodrigues

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*O. opifera* Mart. from the vicinity of Manaus, Amazonas, cf. voucher Herbarium INPA 9210, identified by M. Freitas.

*O. sp.* from the Ducke Forest Reserve, near Manaus, voucher Herbarium INPA 42208.

It must be concluded that all these species lack the enzymes necessary to channel cinnamates into more complex end products. The ferulic acid, which is thus accumulated, inhibits L-phenylalanine ammonia-lyase activity [Havir and Hanson, 1968] and, as a consequence, the formation of benzyloquinoline alkaloids should be favoured. Indeed, the above mentioned unclassified *Ocotea* species contains two papaverine type alkaloids [Franca et al., 1975]. This mechanism may explain the fairly general substitutive presence of benzyloquinolines vs. arylpropanoids in the Magnoliidae [Gottlieb, 1972], i.e. the phe-

nomenon by which a species contains predominantly one of these classes of metabolites, producing, if at all, only traces of the other

#### LITERATURE CITED

- HAVIR, E.A. & HANSON, K.R.  
1968 — L-Phenylalanine ammonia-lyase. II. Mechanism and kinetic properties of the enzyme from potato tubers. **Biochemistry**, 7(5) : 1904-1914.
- FRANCA, N.C.; GIESBRECHT, A.M.; GOTTLIEB, O.R.; MAGALHÃES, A.F.; MAGALHÃES, E.G. & MAIA, J.G.S.  
1975 — Benzyloquinolines from *Ocotea* species. **Phytochemistry**, 14 : 1671-1672.
- DIAZ, A.M.P. DE; GOTTLIEB, O.R.; MAGALHÃES, A.F.; MAGALHÃES, E.G. & MAIA, J.G.S.  
1977 — Notes on *Aniba* species. **Acta Amazonica**, 7(1) : 41-43.
- GOTTLIEB, O.R.  
1972 — Chemosystematics of the Lauraceae. **Phytochemistry**, 11 : 1537-1570.