Phytochemistry, 1978, Vol. 17, pp 1812–1813 © Pergamon Press Ltd Printed in England. 0031-9422/78/1001-1812 $02.00/0

# FLAVONOIDS FROM THE SEEDS OF SIX *LONCHOCARPUS* SPECIES

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(*Received* 6 *March* 1978)

**Key Word Index**—*Lonchocarpus*; Leguminosae; flavonoids; rotenoids; 3-hydroxyisoloncocarpin.

## INTRODUCTION

In connection with the International Conference on Leguminosae to be held in London in 1978, we have begun a systematic investigation of flavonoids and rotenoids in the Leguminosae with a special emphasis on the two closely related genera, *Lonchocarpus* and *Derris*. A wide range of flavonoids and rotenoids have previously been reported in *L. longistylus* [1], *L. neuroscapha* [2], *L. laxiflorus* [3], *L. utilis* [4], *L.* (or *D.*) *urucu* [5, 6], *L.* (or *D.*) *obtusa* [7], *D. amazonica* [5], *L. floribundus* [5], *D. sericea* [8], *D. chinensis* [4], *D. elliptica* [6], *D. malaccensis* [9], *L. rariflorus* [10], *D. robusta* [11], *D. scandens* [12], and *D. glabrescens* [13].

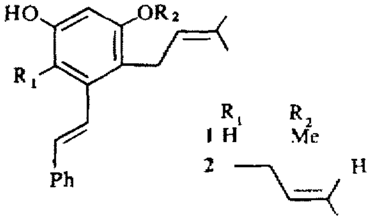
In this paper we report the results obtained for six further species of *Lonchocarpus*: *L. peninsularis*, *L. xuul*, *L. eriocaulinalis*, *L. unifoliatus*, *L. sericeus* and *L. capassa*.

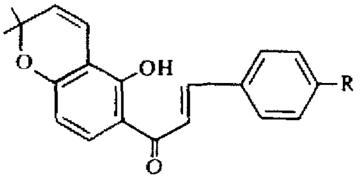
## RESULTS

Compounds were identified in the conventional way by direct comparison (mmp, TLC and NMR) with authentic samples previously isolated in our laboratory. From *L. peninsularis* two prenylated stilbenes, longistyline C, **1** and longistyline D, **2**, whose structures were recently elucidated by us [1], were isolated. From *L. xuul* three chalkones were identified: lonchocarpin, **3**, derricidin (cordoin), **4** and 4-hydroxylonchocarpin, **5**. In *L. unifoliatus* two rotenoids, deguelin, **6** and tephrosin, **7** were present. Three samples of *L. capassa* from different sources were examined, but no flavonoids or rotenoids were detected.

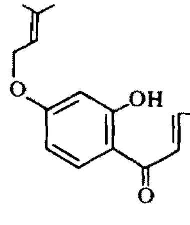
From *L. sericeus* the following compounds were identified: lonchocarpin, **3**, derricin, **8**, derricidin (cordoin) **4**, isolonchocarpin, **9**, isocordoin **10** and 4-hydroxylonchocarpin, **5**. Root bark of this species from NE of Brazil has previously been shown [8] to contain all but two of these compounds. The apparent absence of isocordoin and 4-hydroxylonchocarpin from the Brazilian sample is probably due however to the use of hexane rather than methanol for extraction.

From *L. eriocaulinalis* two compounds were isolated. Isolonchocarpin, **9**, was the main component; the minor one proved to be a new flavonol. On the basis of analytical data and of the molecular peak ($M^+$ 322) in the mass spectrum, a molecular formula $C_{20}H_{18}O_4$ was deduced.

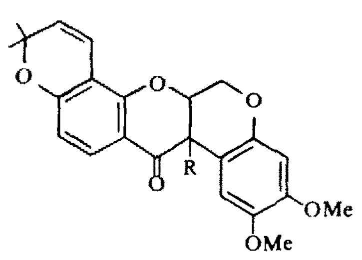




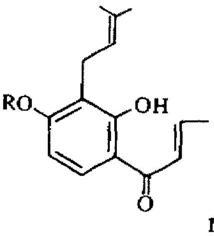
**3** R = H
**5** R = OH



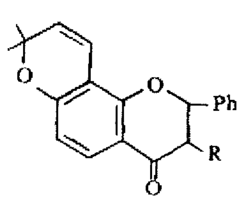
**4**



**6** R = H
**7** R = OH



**8** R = Me
**10** R = H



**9** R = H
**11** R = OH

UV spectrum suggested a flavanone or 3-hydroxyflavanone structure without a hydroxyl in the 5 position. From these data and from the NMR spectrum (see Experimental) the structure, **11**, 3-hydroxyisoloncocarpin, was assigned to the new compound. The structure was confirmed by Algar–Flynn synthesis from *O*-benzyllonchocarpin according to the method of Chopin *et al.* [14].

From these and previously reported results [1–13], it may be deduced that prenylated flavonoids are almost ubiquitous in *Lonchocarpus* and *Derris* species, whereas rotenoids are limited only to some species (*L. unifoliatus*, *D. malacensis* [9], *D. elliptica* [6], *D. chinensis* [4], *L. utilis* [4], and *L. or D. urucu* [5, 6]. Prenylated flavonoids may be considered biogenetic precursors of the rotenoids. Rarer components are prenylated stilbenes (*L. peninsularis*, *L. longistylus* [1], *D. rarifolora* [10] and *D. floribunda* [5]) and 3-phenyl-4-hydroxycoumarins (*D. robusta* [11], *D. scandens* [12] and *D. glabrescens* [13]).

The taxonomic revision of genera *Derris* and *Lonchocarpus*, on a worldwide basis, is badly needed. Our study, especially when extended to other species, may contribute to a better knowledge of the status of these two related genera and permit the sorting out of species on a more rational basis. The nomenclature of South American species is in accordance with Krukoff and Smith's paper [15] (see also [16]).

## EXPERIMENTAL

*Plant material.* 8 g *L. xuul* Lundell (Dwyer 12399) from Belize; 9.3 g *L. unifoliatus* Benth (R. Cedillo, J. Calzada 179) from Mexico; 10 g *L. capassa* Rolfe (Dr. Fanshaw s.n. (Krukoff Herbarium 1974/10) from Zambia; 7.6 g *L. capassa* Rolfe (Th. Müller 1974/15) from Rhodesia; 12.9 g *L.* capassa Rolfe (Nat. Bot. Garden--Kirstenbosh s.n. (1975/3) from South Africa; 15 g *L. sericeus* Hatch, Greenw. (Faden 74/9, MO 74243) from Ghana; 10 g *L. peninsularis* (Dr. Janzen) from Costa Rica; 3.5 g *L. eriocaulinalis* from South America. The first 6 samples of 4 spp. were obtained from B. A. Krukoff's collections and they are backed by herbarium material in various institutions. The last 2 samples were supplied by Prof. E. A. Bell and the voucher is present in the Kew herbarium.

*Extraction and separation.* Seeds were powdered and continuously extracted with hot MeOH. The extract was decanted from an oil (triglycerides) and evapd. The residue was dissolved in $CHCl_3$ and filtered from insoluble material (positive ninhydrin for amino acids) and the soln evapd. The crude extract was chromatographed on Si gel and the column was eluted with $C_6H_6$ and $C_6H_6$-EtOAc mixtures.

*3-hydroxyisolonchocarpin* **11**. Crystals from MeOH mp 161–2° (Found: C, 74.40; H, 5.73. $C_{20}H_{18}O_4$ requires: C, 74.52; H, 5.63%). UV $\lambda_{max}^{MeOH}$ nm (log $\varepsilon$): 264 (4.26), 300 sh (3.86). PMR (60 MHz, $CDCl_3$): $\delta$ 7.7 (1H, *d*, $J$ = 9 Hz, H-5), 7.6–7.3 (5H, *m*, $C_6H_5$—), 6.6 (1H, *d*, $J$ = 10 Hz, H-α), 6.45 (1H, *d*, $J$ = 9 Hz, H-6), 5.5 (1H, *d*, $J$ = 10 Hz, H-β), 5.06 (1H, *d*, $J$ = 12 Hz, H-2), 4.46 (1H, *d*, $J$ = 12 Hz, H-3), 3.7 (1H, exchangeable with $D_2O$, OH), 1.23 (6H, *s*, gem-dimethyls). IR $\nu_{max}^{CHCl_3}$ cm$^{-1}$: 3600, 1680.

In *L. eriocaulinalis* 2 other flavanones were present. The small amount of plant material (3.5 g) made purification and identification of these minor components impossible.

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