sativa (Leguminosae) [5]. The occurrence of hydroxyarginines within the Leguminosae has been reviewed by Bell [6].

EXPERIMENTAL

Pea seedlings were grown in the dark in Petri dishes for 4 days and 200 g homogenised in 5 vol of 5% trichloroacetic acid. After standing for at least 7 days, the extract was centrifuged and the supernatant passed through a column (2 × 3 cm) of Dowex-50 W × 2, 200–400 mesh (H^+ form). The column was washed with H_2O and most of the amino acids were eluted with 1.5 M NH_4OH (50 ml) and discarded. The column was washed with H_2O (75 ml) until free of NH_4OH and the inorganic cations eluted with 0.4 M HCl (40 ml). The amine/lactone fraction was then eluted with 6 M HCl (40 ml) and dried. On dissolving in 0.1 M HCl (2 ml), 10 μl was subjected to TLC on cellulose CC-41 buffered at pH 2 with KCl–HCl, using phenol:pH 2 buffer (5:1) as solvent [7]. A yellow–brown spot suggesting a lactone was detected at R_f 0.56 with ninhydrin as chromogenic reagent. The spot was also Sakaguchi positive, indicating the presence of the guanidino group. On drying the amine fraction, 2 ml of 18 M NH_4OH was added to hydrolyse the lactone. After 18 hr, the soln was diluted with 8 vol H_2O and re-applied to the column (H^+ form). The unknown was eluted in 1.5 M NH_4OH, dried, dissolved in 0.1 M HCl (5 ml) and left for 24 hr to relactonize. By this means the unknown was obtained relatively free of contamination. The properties of the unknown (R_f, guanidino group, lactonization), in agreement with the properties of authentic material, suggested that it is γ-hydroxyhomoarginine. The yield was *ca* 20 mg. Attempts to crystallize the syrupy product obtained by concentrating the final fraction failed, as found previously for γ-hydroxyarginine [4]. This may be due to admixture of di and monohydrochlorides (E. A. Bell, personal communication). MS of the lactone at 220° gave peaks at *m/e* 374, 373, 313, 297 (all less than 1%), 275 (6), 259 (77), 168 (39), 165 (46), 151 (66), 96 (100), 59 (80), indicating dimerization. IRν_{max}^{KBr} showed 1780 (γ-lactone) 1650, 1410, 1350, 1310, 1220, 1200, 1080, 1000, 970, 780 cm^{-1}. MS and IR of authentic (2 HCl) and extracted material were identical.

Acknowledgements—We are grateful to Professor B. Witkop of National Institutes of Health, Bethesda, Maryland, U.S.A., for providing us with synthetic γ-hydroxyhomoarginine lactone, and we are indebted to Professor E. A. Bell of King's College, London, for his advice and encouragement. Thanks are also due to Dr. D. A. M. Watkins for the IR spectra and to Mrs. B. Roberts and Mr. D. Puckey for the MS.

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Phytochemistry, 1976, Vol. 15, pp. 1566–1567. Pergamon Press. Printed in England.

CYANOLIPIDS IN *SAPINDUS EMARGINATUS* SEED OIL

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(*Revised received* 25 *March* 1976)

Key Word Index—*Sapindus emarginatus*: Sapindaceae; cyanolipids; triglycerides; argentation TLC; GLC; MS; fatty acid composition; double bond position.

Four types of cyanolipids, present individually or in pairs, have been identified in the seed lipids of the Boraginaceae [1,2] and some Sapindaceae species [3–8]. In this paper we report the isolation, identification and composition of one such cyanolipid, namely, the fatty acid diester of 1-cyano-2-hydroxymethylprop-l-ene-3-ol, in the oil of *Sapindus emarginatus* Vahl. (a soapnut). The fatty acid composition of the cyanolipid components is also compared with that of triglycerides.

S. emarginatus seed kernels contained 41% oil. On Si gel G TLC, the oil gave two spots (triglyceride, R_f 0.77 and cyanolipid, R_f 0.52) with Et_2O–petrol (40–60°) (PE) but only a single spot with C_6H_6. This TLC behaviour suggested that the cyanolipid is likely to be a diester of 1-cyano-2-hydroxymethylprop-1-ene-3-ol [5]. The oil was resolved into a triglyceride fraction (82%) and a cyanolipid fraction (16%) by preparative-TLC. The cyanolipid fraction gave ν_{max} 2220 cm^{-1} and ϵ 18845 at λ_{max} 208 nm. The PMR showed peaks at τ 9.14, 8.75, 8.05, 7.97, 7.67, 5.33, 5.13, 4.7 and 4.45 as also shown by the reference sample of fatty acid diesters of 1-cyano-2-hydroxymethyl-prop-1-ene-3-ol, isolated from *Cardiospermum halicacabum* seed oil [5]. The major M^+ peaks in the MS of the cyanolipids were *m/e* 671 and 669 followed by low intensity peaks corresponding to M^+ of 699, 697, 645, 641 and 615. Prominent peaks belonging to $R{-}C{\equiv}O^+$, $R{-}\underset{\underset{\displaystyle O}{\|}}{C}{-}O^+$, were also obtained. The picrate test was negative, as is the case with the similar cyanolipid of *Koelreuteria paniculata* seed oil [4]. GLC of the Me esters gave the composition reported in Table 1.

The total cyanolipid was separated into three fractions (26.8, 67.7 and 5.5%) by A_gNO_3 TLC, based on the degree of unsaturation of the fatty acid moieties as shown by the magnitude of peak at τ 4.7. In the MS of the three fractions, the M^+ ions of decreasing intensity were *m/e* 669, 641 and 697; 671, 643, 615 and 699; and 645, 673, 617, 589 and 701. These fractions gave ϵ 16235, 18730 and 20507 at λ_{max} 208 nm, corresponding to the major M^+ peaks in the MS. The fatty acid compositions are recorded in Table 1. A higher proportion of eico-

Table 1. Fatty acid composition of triglycerides, cyanolipids and the cyanolipid fractions of *Sapindus emarginatus* seed oil

Lipid	Concn wt %	Fatty acid, (mol %) 16:0	18:0	18:1	18:2	20:0	20:1	22:0
Triglycerides	82.0	8.8	3.0	64.7	2.9	11.8	8.8	—
Cyanolipids	16.0	3.9	1.2	49.8	Trace	33.2	11.9	Trace
Argentation TLC fractions								
First	26.8	—	—	55.0	—	—	45.0	—
Second	67.7	2.8	—	49.2	—	46.5	—	1.5
Third	5.5	46.8	3.3	—	—	49.9	—	—

sanoic acid occurs in the cyanolipids than in the triglycerides.

MS of the methoxy derivatives [9] gave peaks at *m/e* 157, 171, 201, 215, 229 and 243. These showed the presence of a double bond at the 9 position from the terminal Me group in both the 18:1 and 20:1 acids.

EXPERIMENTAL

Oil was Soxhlet extracted from *S. emarginatus* kernels with PE. TLC was carried out on 0.25 mm Si gel G layers using both C_6H_6 and Et_2O–PE–HOAc (15:85:1). Cyanolipids were isolated on 1 mm Si gel G layers using 15% Et_2O in PE. Cyanolipids were fractionated on 0.5 mm layers of 5% $AgNO_3$-impregnated Si gel G using CCl_4–$CHCl_3$–EtOH (50:50:1), and detected with ethanolic 2′, 7′-dichlorofluorescein and estimated gravimetrically. The Me esters were prepared using 1% NaOMe in MeOH. Total Me esters from the triglycerides and the monoene Me esters from the cyanolipids, isolated by $AgNO_3$ TLC were converted to methoxy derivatives and purified [9]. The PMR spectra were measured in CCl_4 at 60 MH_2.

Acknowledgements—G.G. thanks the CSIR, India for a Junior Research Fellowship. Thanks are also due to Dr. N. Ramaiah, Dept. of Botany, Osmania Univ., Hyderabad for botanical identification.

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Phytochemistry, 1976, Vol. 15, pp. 1567–1568. Pergamon Press. Printed in England.

ASATONE IN *ASARUM* (ARISTOLOCHIACEAE)

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(*Revised received* 29 *March* 1976)

Key Word Index—*Asarum*; Heterotropa; Aristolochiaceae; *Asarum hexalobum*, *A. asperum*, *A. oblongum*, *A. tamaense*, *A. tamaense* var. *muramatsui*, *A. nipponicum*; *n*-hexane extractives; asatone.

Plants and source. Asarum hexalobum F. Maekawa and *Asarum asperum* F. Maekawa collected in May at Hiroshima Prefecture. *Asarum oblongum* F. Maekawa collected in July at Shimane and Tottori. *Asarum tamaense* Makino collected in December at Tokyo. *Asarum tamaense* var. *muramatsui* (Makino) Sugimoto and *Asarum nipponicum* F. Maekawa var. *nipponicum* collected in December at Shizuoka. *Asarum hexalobum* var. *perfectum* F. Maekawa and *Asarum satsumense* F. Maekawa collected in January at Kagoshima. *Asarum unzen* (F. Maekawa) Kitamura collected in December at Saga. *Asarum asaroides* (Morr. et Decne) Makino collected in May. *Asarum curvistigma* F. Maekawa collected at Yamanashi in December. *Uses*. Medicinal. *Previous work*. Recently Yamamura *et al.* [1,2] isolated a new neolignane, Asatone from *n*-hexane extractives of *A. taitonense* Hayata growing in Formosa and from *A. nipponicum* var. *brachypodion*, *A. takaoi* F. Maekawa var. *takaoi*. *A. hexalobum* var. *perfectum*, *A. curvistigma* F. Maekawa of Japan.