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ATRIPLEX NUMMULARIA, A SOURCE FOR THE TWO MOLLUSCICIDE SAPONINS: HEDERAGENIN-3-*O*-β-D-GLUCURONOPYRANOSIDE AND CALENDULOSIDE E

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As a part of an investigation of the phytochemistry of *Atriplex nummularia* Lindley (Chenopodiaceae), a 2-3 m high shrub common in the Nile Delta and oases of Egypt (1), we isolated the two monodesmosidic saponins hederagenin-3-*O*-β-D-glucuronopyranoside and oleanolic acid-3-*O*-β-D-glucuronopyranoside (calenduloside E) in a yield of 2% of dried plant material for each of the two glucuronides. Both of the saponins have previously been reported to be potent molluscicides (2). Thus, *A. nummularia* might be a potent tool for controlling schistosomiasis, which is considered to be one of the most significant and rapidly spreading parasitic diseases in many tropical and subtropical parts of Africa, the Middle East, the Far East, some Caribean Islands, and many parts of South America (3-5).

EXPERIMENTAL

PLANT MATERIAL.—Aerial parts of flowering *A. nummularia* were collected from the wild in the coastal region about 30 km from Alexandria. Identification was confirmed by Dr. Loutfy Pollus, Professor of Plant Taxonomy, Faculty of Science, Cairo University.

EXTRACTION AND ISOLATION.—Oven-dried plant material (500 g) was defatted (light petroleum ether bp 40-60°) and extracted in a Soxhlet apparatus for 24 h with EtOH. After concentration, a yellowish white deposit was isolated and washed with $CHCl_3$. An analytical sample (50 mg) of the deposit was chromatographed by hplc [LiChrosorp RP 18 (Knauer prepacked column, dimensions 250×8 mm, particle size 7 μm) eluent MeOH-0.5% aqueous HOAc (9:1), flow 2.5 ml/min] to give hederagenin-3-*O*-β-D-glucuronopyranoside (31 mg) $[\alpha]^{20}D$ 5 (*c* 0.13, EtOH) and oleanolic acid-3-*O*-β-D-glucuronopyranoside (12 mg) $[\alpha]^{20}D$ 14 (*c* 0.11, EtOH) (ref. 6: $[\alpha]^{20}D$ 14). The 270 MHz ^1H-nmr spectra of the sapogenins isolated after HCl (0.5 N) hydrolysis of the saponins were identical with those of authentic hederagenin and oleanolic acid, respectively. Full details of the ^1H- and ^{13}C-nmr spectra are available on request.

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