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SHORT COMMUNICATION

Chemical constituents of *Euphorbia hyberna* L. (Euphorbiaceae)

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Chemical investigation of the aerial part and the roots of *Euphorbia hyberna* L. subs. *hyberna*. resulted in the isolation and identification of four triterpenoids (3β -*O*-octadecanoyllupeol (**1**), glut-5-en- 3β -ol (**2**), 24-methylenecicloartan- 3β -ol (**3**) and cicloart-23-ene- 3β ,25-diol (**6**)) along with the phenolic compounds ellagic acid (**4**) and 3,3'-di-*O*-methylellagic acid (**7**). Although these are all known compounds, this is the first report of their isolation from this plant. Their structures were elucidated on the basis of spectral methods, including 2D NMR experiences, and confirmed by comparing with the literature data.

Keywords: *Euphorbia hyberna* L.; Euphorbiaceae; triterpenoids; phenolic compounds

1. Introduction

Euphorbia species have been a subject of interest to several investigators regarding their constituents, particularly di- and triterpenoids. Plants of the genus *Euphorbia* are known to have biological activities and an ancient use in traditional or folk medicines due to the recognised antitumour, antimicrobial, antimalarial and antiviral properties (Ferreira, L.H.M. Carvalho, & M.J.M. Carvalho, 2006).

Euphorbia hyberna L. (Euphorbiaceae) is a small shrub widespread in damp and high places of south of Europe and in South-west Ireland that evidence a skin irritant activity. In previous years two subspecies of *E. hyberna* L., namely subsp. *hyberna* (NE Portugal) and subsp. *insularis* (Sardinia), were examined, and macrocyclic diterpenoids with the jatrophone and the lathyrene frameworks were found (Appendino, Spagliardi, Ballero, & Seu, 2002; Ferreira, L.H.M. Carvalho, A.M.S. Carvalho, & Silva, 2002).

Further examination of extracts of *E. hyberna* L. subsp. *hyberna* led to the isolation of seven known compounds. All these compounds are reported for the first time in this species.

2. Results and discussion

Seven known compounds were isolated from *E. hyberna* L. subsp. *hyberna*. The structures of all these compounds were elucidated on the basis of spectral

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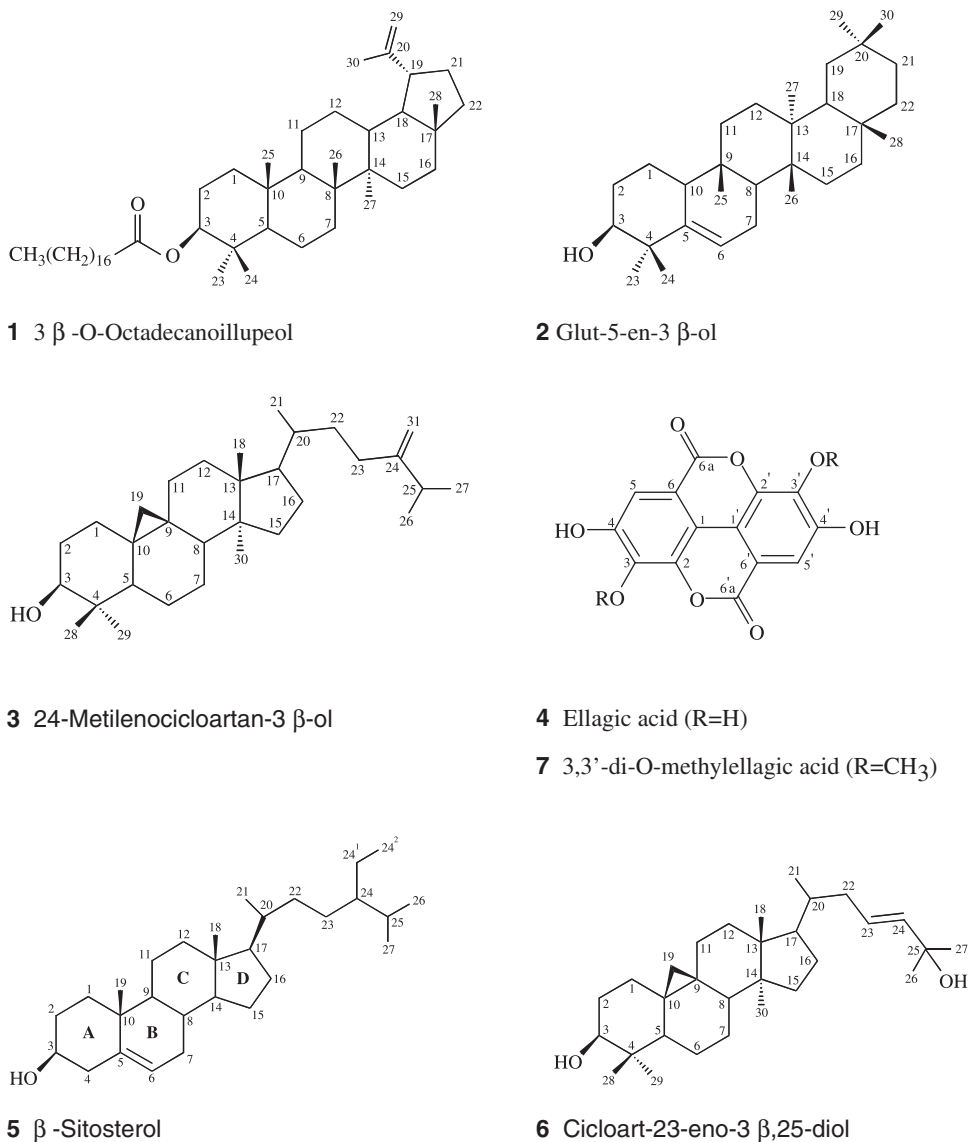


Figure 1. Structures of compounds isolated from *E. hyberna* L. subsp. *hyberna*.

methods, including 2D NMR experiences, and confirmed by comparing with the literature data.

The following compounds were isolated from the *n*-hexane soluble fraction from chloroform extract of the aerial part compounds: 3 β -O-octadecanoillupeol (**1**) (Ammann, Richarz, Wirthlin, & Wendisch, 1982; Brum, Honda, Hess, Cavalheiro, & Monache, 1998; Hui, & Li, 1976; Kwon et al., 2003; Matsunaga, Tanaka, & Okagi, 1988; Miranda, Silva, Duarte, & Filho, 2007; Mustafa et al., 2000; Wenkert, Baddeley, Burfitt, & Moreno, 1978; Yang, Gao, & Jia, 2003), glut-5-en-3 β -ol (**2**) (Carvalho & Seita, 1993; Khan, Ahmed, Kazmal, & Malik, 1987; Matsunaga et al., 1988) and 24-methylenocicloartan-3 β -ol (**3**) (Audier, Beugelmans, & Das, 1966; Passannanti, Paternostro, Piozzi, & Faarax, 1985; Rustaiyan, Niknejad, Sharif, & Izaddoost, 1982; Teresa et al., 1987) (Figure 1).

Ellagic acid (**4**) (Bindra, Satti, & Suri, 1988; Hillis & Yazaki, 1973; Hussain, 1974; Pakulski & Budzianowski, 1996) and β -sitosterol (**5**) (Dellagreca, Monaco, & Previtera, 1990; Seo, Tomita, & Tori, 1978) were isolated from the acetone extract of the aerial part compounds (Figure 1).

The acetone-soluble fraction of the chloroform extract of the roots afforded cicloart-23-en-3 β ,25-diol (**6**) (Audier et al., 1966; Dellagreca et al., 1990; Khan et al., 1987; Seo et al., 1978; Takahashi, Satoh, Hongo, & Koshino, 2007; Teresa et al., 1987) and again, the ubiquitous steroid, β -sitosterol (**5**) (Figure 1).

3,3'-Di-*O*-methylellagic acid (**7**) was isolated from the acetone non-soluble fraction of chloroform extract of the roots (Atta-Ur-Rahman et al., 2001; Bindra et al., 1988; Hillis & Yazaki, 1973; Hussain, 1974; Pakulski & Budzianowski, 1996; Sato, 1987) (Figure 1).

3. Conclusions

From *E. hyberna* L. subsp. *hyberna*, four triterpenoids (**1**, **2**, **3** and **6**) and two phenolic acids (**4** and **7**) were isolated and identified. These results support the fact that Euphorbiaceae family is rich in secondary metabolites belonging to terpenoid class, particularly triterpenoids.

Supplementary material

Experimental details are available online.

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References

- Ammann, W., Richarz, R., Wirthlin, T., & Wendisch, D. (1982). ^1H and ^{13}C chemical shifts and coupling constants of lupane. Application of two-dimensional NMR techniques. *Organic Magnetic Resonance*, *20*, 260–265.
- Appendino, G., Spagliardi, P., Ballero, M., & Seu, G. (2002). Macrocyclic diterpenoids from *Euphorbia hyberna* L. subsp. *insularis* and their reaction with oxyphilic reagents. *Fitoterapia*, *73*, 576–582.
- Atta-Ur-Rahman, A., Ngounou, F.N., Choudhary, M.I., Malik, S., Makhmoor, T., Nur-E-Alam, M.,... Sondengam, B.L. (2001). New antioxidant and antimicrobial ellagic acid derivatives from *Pteleopsis hylodendron*. *Planta Medica*, *67*, 335–339.
- Audier, H.E., Beugelmans, R., & Das, B.C. (1966). Mass spectrometry of tetracyclic triterpenes. Part II. The lanostane group: influence of the 9:19-cyclopropane ring. *Tetrahedron Letters*, *36*, 4341–4347.
- Bindra, R.S., Satti, N.K., & Suri, O.P. (1988). Isolation and structures of ellagic acid derivatives from *Euphorbia acaulis*. *Phytochemistry*, *27*, 2313–2315.
- Brum, R.L., Honda, N.K., Hess, S.C., Cavalheiro, A.J., & Monache, F.D. (1998). Acyl lupeols from *Cnidioscolus vitifolius*. *Phytochemistry*, *49*, 1127–1128.
- Carvalho, L.M., & Seita, J. (1993). A new oleanolic acid derivative from *Securinega tinctoria*. *Planta Medica*, *59*, 369–372.
- Dellagreca, M., Monaco, P., & Previtera, L. (1990). Stigmasterols from *Typha latifolia*. *Journal of Natural Products*, *53*, 1430–1435.
- Ferreira, A.M.V.D., Carvalho, L.H.M., & Carvalho, M.J.M. (2006). Recent studies on the biological activities of the plants of the family Euphorbiaceae. In G. Brahmachari (Ed.), *Chemistry of Natural Products: Recent Trends & Developments* (pp. 361–398). India: Research Signpost.
- Ferreira, A.M.V.D., Carvalho, L.H.M., Carvalho, M.J.M., & Silva, A.M.S. (2002). Jatrophone and lathyrene diterpenoids from *Euphorbia hyberna* L. *Phytochemistry*, *61*, 373–377.
- Hillis, W.E., & Yazaki, Y. (1973). Properties of some methylellagic acids and their glycosides. *Phytochemistry*, *12*, 2963–2968.
- Hui, W.-H., & Li, M.-M. (1976). Lupene triterpenoids from *Glochidion eriocarpum*. *Phytochemistry*, *15*, 561–562.
- Hussain, S.F. (1974). Ellagic acids from *Euphorbia cornigera* and *Euphorbia wallichii*. *Phytochemistry*, *13*, 867–868.

- Khan, A.Q., Ahmed, Z., Kazmal, N.-H., & Malik, A. (1987). Further triterpenes from the stem bark of *Euphorbia tirucalli*. *Planta Medica*, *53*, 577–577.
- Kwon, H.C., Min, Y.D., Kim, K.R., Bang, E.J., Lee, C.S., & Lee, K.R. (2003). A new acylglycosyl sterol from *Quisqualis Fructus*. *Archives of Pharmacal Research*, *26*, 275–278.
- Matsunaga, S., Tanaka, R., & Okagi, M. (1988). Triterpenoids from *Euphorbia maculata*. *Phytochemistry*, *27*, 535–537.
- Miranda, R.R.S., Silva, G.D.F., Duarte, L.P., & Filho, S.A.V. (2007). Triterpene esters isolated from leaves of *Maytenus salicifolia* Reissek. *Helvetica Chimica Acta*, *90*, 652–658.
- Mustafa, G., Anis, E., Ahmed, S., Anis, I., Ahmed, H., Malik, A., ... Choudhary, M.I. (2000). Lupene-type triterpenes from *Periploca aphylla*. *Journal of Natural Products*, *63*, 881–883.
- Pakulski, G., & Budzianowski, J. (1996). Ellagic acid derivatives and naphthoquinones of *Dionaea muscipula* from *in vitro* cultures. *Phytochemistry*, *41*, 775–778.
- Passannanti, S., Paternostro, M., Piozzi, F., & Faarax, M.X. (1985). Terpenoids from the latex of *Euphorbia ruspolii*. *Fitoterapia*, *56*, 47–47.
- Rustaiyan, A., Niknejad, A., Sharif, Z., & Izaddoost, M. (1982). Triterpene from *Euphorbia betiolata*. *Fitoterapia*, *53*, 143–144.
- Sato, T. (1987). Spectral differentiation of 3,3'-di-*O*-methylellagic acid from 4,4'-di-*O*-methylellagic acid. *Phytochemistry*, *26*, 2124–2125.
- Seo, S., Tomita, Y., & Tori, K. (1978). Biosynthesis of b-sitosterol from [4-¹³C]mevalonic acid and sodium [1,2-¹³C]acetate in tissue cultures of *Isodon japonicus* Hara. *Journal of the Chemical Society, Chemical Communications*, *7*, 319–320.
- Takahashi, S., Satoh, H., Hongo, Y., & Koshino, H. (2007). Structural revision of terpenoids with a (3*Z*)-2-methyl-3-penten-2-ol moiety by the synthesis of (23*E*)- and (23*Z*)-cycloart-23-ene-3,25-diols. *Journal of Organic Chemistry*, *72*, 4578–4581.
- Teresa, J.P., Urones, J.G., Marcos, I.S., Basab, P., Cuadrado, M.J.S., & Moro, R.F. (1987). Triterpenes from *Euphorbia broteri*. *Phytochemistry*, *26*, 1767–1776.
- Wenkert, E., Baddeley, G.V., Burfitt, I.R., & Moreno, L.N. (1978). Carbon-13 nuclear magnetic resonance spectroscopy of naturally occurring substances. LVII. Triterpenes related to lupane and hopane. *Organic Magnetic Resonance*, *11*, 337–343.
- Yang, Z.-D., Gao, K., & Jia, Z.-J. (2003). Eudesmane derivatives and other constituents from *Saussurea parviflora*. *Phytochemistry*, *62*, 1195–1199.