

ANATOLIONE : A NEW DITERPENE FROM *MARRUBIUM PARVIFLORUM* OLIGODON

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Chemical constituents of *Marrubium parviflorum* have been investigated. Thus a new diterpene compound has been isolated and its structure is elucidated on the basis of spectral studies which shows it is hitherto an unreported diterpene.

**Keywords:** *M. Parviflorum*, Labiatae, Diterpene, Anatolione.

### Introduction

*Marrubium* is small genus of annual and perennial herbs belonging to family Labiatae. It is distributed through out Europe, North Africa and Asia [1]. *Marrubium parviflorum* oligodon a species of *Marrubium* is cultivated in Southern Russia, Iran and Turkiye [2]. Especially the rich and divers Flora of Turkiye has a considerable percentage of terpeneic plant species. *Marrubium* contains about 40 species but only a few of them have been investigated [3]. Very little medicinal uses has been reported in case of *Marrubium parviflorum*, however, another species of this genus, *M. Vulgare* has been found to be very much medicinal value [4-7].

### Experimental

**General experimental procedures.** The IR spectra were recorded on a JASCO A-302 spectrometer. The mass spectrum was recorded on a Finnigan MAT-312 spectrometer connected to a PDP 11/34 (DEC) computer system. The <sup>1</sup>H-NMR and <sup>13</sup>C-NMR spectra were recorded on Bruker AM-400 spectrometer in C<sub>5</sub>D<sub>5</sub>N with TMS as internal reference.

**Plant material.** The plant material was collected in May 1990 from the village of Mulk, Sivrihisar, Eskisehir, Turkiye and was identified by Dr. Kerim Alpinar from Istanbul University, Faculty of Pharmacy (Voucher No.62485).

**Isolation of the compound:** The air dried and ground plant material (135 g) was extracted in chloroform at room temperature for 3 days. The dried and filtered extract, after evaporation of chloroform under vacuum, yielded a dark green viscous oil (4 g) which was stored in a sealed container at low temperature (4°C). It was dissolved in ethylacetate and washed with aqueous 10% Na<sub>2</sub>CO<sub>3</sub>, 1% HCl, water dried over anhydrous sodium sulphate. On evaporation of ethylacetate under reduced pressure yielded a residue (2.7 g). This residue was chromatographed over silica gel column PF254. Elution was made with pet. ether (40-60°C) containing increasing of

ethylacetate. Elution with 50% ethylacetate-pet ether gave a fraction (0.210 g) which was purified by preparative layer chromatography. It gave anatolione which was recrystallized from ether-pet.ether, 18 mg, m.p.134-136°, [c]<sub>D</sub><sup>20</sup> = -18.4 (c=0.35, CHCl<sub>3</sub>) IR(KBr) Vmax cm<sup>-1</sup> 3500, 3210, 1680, 1618, 870. <sup>1</sup>H-NMR (C<sub>5</sub>D<sub>5</sub>N) 7 1.99 (3H, s, Me-17), 1.15 (3H, s, Me-18) 1.18 (3H, s, Me-20), 2.10 (2H, t, J=7.5 Hz, H2-11), 2.68 (2H, t, J=7.5 Hz, H2-12), 2.75 (1H, s, H-5), 4.25 (1H, s, H-7), 6.33, 7.27, 7.37 (all, m, 1H, furan protons). <sup>13</sup>C-NMR (C<sub>5</sub>D<sub>5</sub>N) 100.61 (MNz) & 35.4 (C-1), 18.9 (c-2), 39.5 (C-3), 44.5 (C-4), 51.2 (c-5), 211.9 (c-6), 124.4 (c-7), 138.5 (c-8), 80.5 (c-9), 40.0 (c-10), 34.6 (C-11), 22.1 (C-12), 126.5 (C-13), 111.5 (C-14), 143.2 (C-15), 139.9 (C-16), 19.7 (C-17), 28.6 (C-18), 67.5 (C-19), 20.2 (C-20).

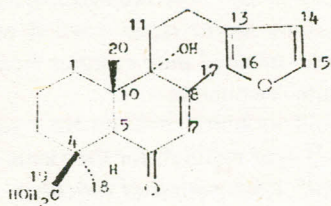
### Results and Discussion

A literature survey of *Marrubium parviflorum* oligodon revealed the fact that no chemical work has been done so far. Therefore, in view of usefulness of its medicinal importance and its related species, it was considered worthwhile to investigate *Marrubium parviflorum* oligodon so as to examine its chemical constituents. As a results of this investigation a new diterpene has been isolated from *Marrubium parviflorum*. Our studies show that this compounds is not identical with any known diterpene and has now been provisionally named as anatolione. This compound melted at 134-136°C. High resolution mass spectrum (HRMs) of the diterpene afforded molecular ion peak at m/z 332.198765 (calcd. as 332.198759) corresponding to the molecular formula for C<sub>20</sub>H<sub>28</sub>O<sub>4</sub>. The <sup>13</sup>C-NMR spectrum showed 20 carbon atoms; the multiplicities of these were determined by using DEPT experiments which revealed the presence of 3 methyl, 6 methylene and 5 methine carbon atoms. The β-substituted furan ring is also indicated by mass, IR and <sup>1</sup>H and <sup>13</sup>C-NMR spectroscopy. The base peak m/z=81 and two other peaks at m/z=95 and 105 were characteristics peaks for β-substituted furan ring. The

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$^1\text{H-NMR}$  spectrum showed resonance attributable to furan protons at  $\delta$  6.33, 7.27 and 7.37 whereas the  $^{13}\text{C-NMR}$  showed signals for furan ring at  $\delta$  126.5, 111.5, 143.9 and 139.9. The presence of an  $\alpha,\beta$ -unsaturated ketone group was proved by IR and  $^{13}\text{C-NMR}$  spectroscopy. The infrared spectrum showed a carbonyl peak at  $1680\text{ cm}^{-1}$ . The  $^{13}\text{C-NMR}$  spectrum showed the signal for carbonyl carbon at  $\delta$  211.9. The  $\text{C}=\text{C}$  stretching vibration occurred at  $1618\text{ cm}^{-1}$  in infrared spectrum. The vinylic proton and proton at C-5 resonated at  $\delta$  4.25 and 2.75 respectively. A set of two triplets were recorded at  $\delta$  2.10 (2H) and  $\delta$  2.68 (2H) for  $\text{H}_2$ -11 and  $\text{H}_2$ -12 respectively. The singlets at  $\delta$  1.99, 1.15 and 1.18 were assigned for three tertiary methyl groups (Me-17, Me-18 and Me-20).

An examination of structure of this compound showed that it is similar to labdane derivatives. The results along with comparison of  $^1\text{H}$  and  $^{13}\text{C-NMR}$  data of our compound with those related to labdane derivatives [3,8-10] suggested that this compound had structure 1.



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