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### Flavonoid constituents of *Dipcadi erythraeum* Webb. & Berthel.

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#### ABSTRACT

Seven flavonoids were isolated for the first time from the defatted aqueous methanol extract of *Dipcadi erythraeum* Webb. & Berthel. They were identified as kaempferol (1), quercetin (2), quercetin 3-O-(6''-α-rhamnopyranosyl)-β-glucopyranoside-7-O-α-rhamnopyranoside (3), vitexin (4), isovitexin (5), orientin (6) and isoorientin (7). Their structures were established on the basis of chemical and spectroscopic analysis and also by comparison with authentic samples. The chemosystematic significance of these compounds was also summarized.

## 1. Introduction

*Dipcadi* Medik. is a genus of bulbous flowering plants recently belonging to the subfamily Scilloideae of family Asparagaceae. It comprised about 40 species, distributed in Southern Europe, most area of Africa, the Middle East and East to South Asia[1]. The greatest diversity is found in South Africa (13 species)[2] and India (9 species)[3]. In Egypt, the genus *Dipcadi* is a member of family Hyacinthaceae and is represented by two species: *Dipcadi erythraeum* (*D. erythraeum*) and *Dipcadi unifolium* Bak.[4]. The genera of this family were initially included within Liliaceae *s.l.*[5]. *D. erythraeum* is a wild medicinal plant. Its bulb and capsule are edible especially in Pakistan[6]. In Bahrain, the leaves are used as a laxative and as an ointment for wounds[7]. The phytochemical

screening of some *Dipcadi* species revealed the presence of alkaloids, tannins, saponins and flavonoids[8-10]. The present study aimed to investigate the flavonoids of *D. erythraeum* which have not yet been reported.

## 2. Material and methods

### 2.1. Plant material

*D. erythraeum* was collected from 120 km along the Cairo-Alexandria desert road, in February 2012 and identified by Dr. Mona Mohamed Marzouk and Dr. Mona Osama El-Shabrawy, Department of Phytochemistry and Plant Systematics, National Research Centre (NRC). A voucher specimen (s.n. MS6) was deposited in the herbarium.

### 2.2. Extraction and isolation

Fine powdered air-dried whole plant of *D. erythraeum* was extracted under reflux three times with 70% methanol/water, and then evaporated under reduced pressure and temperature. The extract was fractionated using CC polyamide column 6S

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(Riedel-De-Haen AG, Hanver, Germany), eluted with MeOH/H<sub>2</sub>O mixtures of decreasing polarities. The obtained fractions were chromatographed on PC (descending) Whatman 3 mm paper, using solvent systems butanol: acetic acid: water (*n*-BuOH–AcOH–H<sub>2</sub>O, 4:1:5, upper phase), 15% AcOH (AcOH: H<sub>2</sub>O, 15:85) and H<sub>2</sub>O. The isolated compounds were further purified on a Sephadex LH-20 column (Pharmazia) with standard solvent systems. Complete acid hydrolysis for *O*-glycosides (2 mol/L HCl, 2 h, 100 °C) were carried out and followed by paper co-chromatography with authentic samples to identify the aglycones and sugar moieties. The sugar units of *C*-glycoside flavonoids were determined using ferric chloride degradation[11].

### 3. Results

The present study dealt with the isolation and characterization of seven flavonoids from *D. erythraeum*. They were identified as kaempferol (1)[12], quercetin (2)[12], quercetin 3-*O*-(6"- $\alpha$ -L-rhamnopyranosyl)- $\beta$ -glucopyranoside-7-*O*- $\alpha$ -rhamnopyranoside (3) [13], vitexin (4)[14], isovitexin (5)[15], orientin (6)[15] and isoorientin (7)[15].

### 4. Discussion

No previous phytochemical studies have been reported for *D. erythraeum*. In the present study, seven flavonoids were isolated and characterized as three flavonols and four *C*-glycosyl flavones. According to previous research, the flavonols (1 and 2) have been isolated from other species of the same family: Asparagaceae[16,17] as well as most species of family Liliaceae[18]. The *C*-glycosyl flavones (4-6) are characteristic to most species of the family Asparagaceae[19,20]. The data indicated that *D. erythraeum* has similar biosynthesis pathway and therefore a closer relationship with the species of Asparagaceae family than Liliaceae. This study provided further phytochemical and biological data to study the medicinal properties of *D. erythraeum*.

### Conflict of interest statement

We declare that we have no conflict of interest.

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