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Chemical Constituents from the Aerial Parts and Rhizomes of *Roscoea purpurea*

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Kaempferide (**1**), kaempferide 3-*O*-*β*-D-glucuronopyranoside (**2**), kaempferol 3-*O*-*β*-D-glucuronopyranoside (**3**) and (*Z*)-3-hexen-1-ol-*β*-D-glucopyranoside (**4**) were isolated from the aerial parts and kaempferide (**1**), kaempferol 3-*O*-methyl ether (**5**) and adenosine (**6**) were isolated from the rhizomes of *Roscoea purpurea* Sm. (Family: Zingiberaceae). All these compounds were isolated for the first time from this plant.

Keywords: *Roscoea purpurea*; Zingiberaceae; Rasgari; Kakoli

Roscoea purpurea Sm. (Family: Zingiberaceae) is a perennial rhizomatous herb about 20-40 cm tall, commonly known as "Rasgari" in Nepal and "Kakoli" in India. It is widely distributed in Nepal, India and Bhutan between 1800 and 2900 m in altitude.[1,2] It is one of the Ayurvedic *Astavarga* plants and is included in many tonic Ayurvedic formulations including *Chyawanaprasha*. Rhizomes are reported to have antirheumatic, febrifuge, galactagogue, haemostatic, expectorant, sexual stimulant, diuretic, sweet, and cooling properties.[2] Rhizomes are widely used as a tonic, aphrodisiac and remedy for wounds and urinary troubles in traditional medicine.[1,3] Detailed isolation and characterization of chemical constituents from *R. purpurea* has not been reported. Thus, the present study focused on the chemical analysis of the aerial parts and rhizomes of *R. purpurea*.

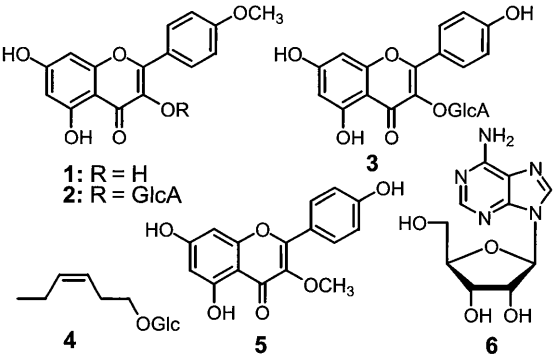

Fig. 1. Structures of isolated compounds.

Fresh aerial parts and rhizomes of *R. purpurea* were collected on August 2012, from Nagarkot, Bhaktapur, Nepal, and shade-dried for one month. The specimen was identified by one of the authors, Prof. Dr. Takashi Watanabe, and has been deposited at the Graduate School of Pharmaceutical Sciences, Kumamoto University, Kumamoto, Japan.

The shade-dried aerial parts (150 g) were extracted with 70% MeOH (4 L x 3 times) at room temperature and the combined extracts were evaporated under reduced pressure to give 24 g of extract. The extract was then suspended in water and separated into water soluble (22 g) and insoluble fractions (2 g). The water soluble fraction was subjected to MCI gel CHP20P column chromatography (CC) and eluted successively with water, and 40%, 70% and 100% MeOH to give 10 fractions (1-10). Fraction 3 (672 mg, 40% MeOH eluate) was subjected to Sephadex LH-20 CC (MeOH) and ODS CC (35% MeOH) to obtain compound **3** (62 mg). Fraction 4 (125 mg, 40% MeOH eluate) was subjected to Sephadex LH-20 column CC (MeOH) to obtain compound **2** (32 mg). Similarly, fraction 5 (166 mg, 70% MeOH eluate) was subjected to Sephadex LH-20 CC (MeOH) to give 5 subfractions (5-1 to 5-5). Subfraction 5-2 (92 mg) was further subjected to silica gel CC ($CHCl_3$:MeOH:water = 9:1:0.1) to obtain compound **4** (16 mg). Subfraction 5-4 was obtained as compound **2** (13 mg). Fraction 9 (923

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mg, MeOH eluate) was subjected to Sephadex LH-20 CC (MeOH) and silica gel CC ($CHCl_3$:MeOH = 10:1) to obtain compound **1** (4 mg).

The shade-dried rhizomes (78 g) were extracted with 70% MeOH (2 L x 3 times) at room temperature and the combined extracts were evaporated under reduced pressure to give 14 g of extract. The extract was then suspended in water and separated into water soluble (10 g) and insoluble fractions (4 g). The water soluble fraction was subjected to MCI gel CHP20P CC and eluted successively with water, and 40%, 70% and 100% MeOH to give 8 fractions (1-8). Fraction 2 (223 mg, water eluate) was subjected to Sephadex LH-20 CC (50% MeOH) and silica gel CC ($CHCl_3$:MeOH:water = 9:1:0.1) to obtain compound **6** (7 mg). Fraction 7 (768 mg, MeOH eluate) was subjected to Sephadex LH-20 CC (MeOH) to give 4 subfractions (7-1 to 7-4). Subfraction 7-2 (30 mg) was further subjected to silica gel CC ($CHCl_3$:MeOH = 10:1) to obtain compound **5** (2 mg). Subfraction 7-3 was obtained as compound **1** (19 mg).

The structures of these compounds were identified as kaempferide (**1**),[4,5] kaempferide 3-*O*-*β*-D-glucuronopyranoside (**2**),[5] kaempferol 3-*O*-*β*-D-glucuronopyranoside (**3**),[6] (*Z*)-3-hexen-1-ol-*β*-D-glucopyranoside (**4**),[7] kaempferol 3-*O*-methyl ether (**5**)[8] and adenosine (**6**)[9] (Fig. 1) on the the basis of spectral data and comparison with literature values. All these compounds were isolated for the first time from *R. purpurea*.

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