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# CONSTITUENTS OF *Tanacetopsis karataviensis*

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*Tanacetopsis karataviensis* (Kovalevsk.) Kovalevsk. (Karatau tansy) is endemic to Central Asia and is used in folk medicine as an anthelmintic [1]. Previously, research on the chemical composition of this species growing in Uzbekistan was started [1, 2]. The sesquiterpene lactones 3*β*,4*β*;1*β*,10*β*-diepoxyguai-11(13)-en-6,12-olide, hanphyllin, karatanolide, 11,13*α*-dihydrokaratanolide, 11,13*β*-dihydrokaratanolide, 1*β*,10*α*-dihydroxyarglabin, and artefin were observed.

In continuation of research on *T. karataviensis* [2], the sesquiterpene lactone 3,4*β*,1,10*β*-diepoxyguai-11(13)-en-6,12-olide (**1**) and the flavonoids hispidulin (**2**), axillarin (**3**), and apigenin (**4**) and a mixture of the triterpenoids *β*-sitosterol and stigmasterol (**5**) were isolated from the $CHCl_3$ fraction of the EtOH extract of the aerial plant part using column chromatography over silica gel with gradient elution.

**3,4*β*,1,10*β*-Diepoxyguai-11(13)-en-6,12-olide (1)**. The spectral data were the same as before [1].

**Hispidulin (5,7,4′-trihydroxy-6-methoxyflavone) (2)** was isolated as yellow crystals, mp 287–289°C. $^1$H NMR (600 MHz, DMSO-$d_6$ + $CCl_4$, δ, ppm, J/Hz): 12.97 (1H, s, 5-OH), 10.22 (1H, s, 7-OH), 9.98 (1H, s, 4′-OH), 7.79 (2H, d, J = 8.9, H-2′, 6′), 6.89 (2H, d, J = 8.9, H-3′, 5′), 6.58 (1H, s, H-8), 6.46 (1H, s, H-3), 3.80 (3H, s, 6-$OCH_3$). $^{13}$C NMR (125 MHz, DMSO-$d_6$ + $CCl_4$, δ, ppm): 182.4 (C-4), 164.1 (C-2), 161.6 (C-4′), 157.5 (C-7), 153.5 (C-5), 152.9 (C-9), 131.7 (C-6), 128.3 (C-2′, 6′), 121.8 (C-1′), 116.3 (C-3′, 5′), 104.7 (C-10), 102.8 (C-3), 94.4 (C-8), 60.2 (6-$OCH_3$) [3].

**Axillarin (5,7,3′,4′-tetrahydroxy-3,6-dimethoxyflavone) (3)** was isolated as yellow crystals, mp 198–200°C. $^1$H NMR (600 MHz, DMSO-$d_6$ +$CCl_4$, δ, ppm, J/Hz): 12.73 (1H, s, 5-OH), 10.28 (1H, s, 7-OH), 9.33 (1H, s, 4′-OH), 9.04 (1H, s, 3′-OH), 7.51 (1H, d, J = 2.0, H-2′), 7.42 (1H, dd, J = 8.4, 2.2, H-6′), 6.88 (1H, d, J = 8.4, H-5′), 6.42 (1H, s, H-8), 3.81 (3H, s, 4′-$OCH_3$), 3.79 (3H, s, 6-$OCH_3$). $^{13}$C NMR (125 MHz, DMSO-$d_6$ + $CCl_4$, δ, ppm): 178.6 (C-4), 157.6 (C-7), 156.1 (C-9), 153.2 (C-2), 152.1 (C-5), 149.0 (C-4′), 145.6 (C-3′), 137.8 (C-3), 131.5 (C-6), 121.4 (C-1′), 120.8 (C-6′), 115.9 (C-2′), 115.8 (C-5′), 105.2 (C-10), 94.0 (C-8), 60.2 (3-$OCH_3$), 59.8 (6-$OCH_3$) [4].

**Apigenin (5,7,4′-trihydroxyflavone) (4)** was isolated as yellow crystals, mp 345–347°C. The spectral data were the same as before [5].

The EtOH extract of the aerial part of *T. karataviensis* collected during flowering on arms of Nuratin ridge in Jizzakh Region of Uzbekistan was analyzed for termiticidal activity under laboratory conditions at the Institute of Zoology, Academy of Sciences of the Republic of Uzbekistan (Tashkent).

Colonies of "worker" Anacanthotermes termites were established from natural termite nests to perform the laboratory experiments. Groups of 100 middle-age "worker" termites were separated from the "worker" termites. During the experiments, 10 worker termites were placed into sterile clay-coated Petri dishes and left for 1 d to adapt to the environment. Solutions of the EtOH extract of the aerial part of *T. karataviensis* at various concentrations (0.1, 0.5, 1.0, 5.0, 10%) for the tests were used to soak filter paper (2 × 2 cm) that was placed into the Petri dishes and served as feed for the termites. The control was filter paper moistened with distilled $H_2O$. Each experiment was performed five times. Petri dishes with termites were stored in a cool and dry place and observed. The numbers of living and dead termites were counted daily.

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TABLE 1. Effect of EtOH Extracts of *T. karataviensis* Aerial Part on Viability of *Anacanthotermes* Termites Under Laboratory Conditions (M ± m; n = 5)*

| Concentration, % | Termite count after treatment, by days (specimens) | | | Biological effectiveness by days, % | | |
|---|---|---|---|---|---|---|
| | 3 | 7 | 10 | 3 | 7 | 10 |
| 0.1 | 86 | 72 | 64 | 5.5 | 16.3 | 18.0 |
| 0.5 | 81 | 68 | 58 | 11.0 | 21.0 | 26.0 |
| 1.0 | 76 | 57 | 45 | 16.5 | 34.0 | 42.3 |
| 5.0 | 65 | 42 | 33 | 29.0 | 51.1 | 58.0 |
| 10.0 | 46 | 36 | 28 | 49.5 | 58.1 | 64.1 |
| Control | 91 | 86 | 78 | – | – | – |

*Number of termites before treatment, 100 specimens.

The effect of the extract on the termites was observed under laboratory conditions at 22–26°C based on the methods of Trushenkova [6], Belyaeva [7], and Hosakawa [8]. The results were statistically processed [9]. The biological effectiveness of the extracts against the termites was calculated using the Abbott formula [10]. Table 1 presents the results.

The results of preliminary research under laboratory conditions established that the EtOH extract from the aerial part of *T. karataviensis* possessed termiticidal activity against *Anacanthotermes* termites. Compounds **2–5** were isolated from *T. karataviensis* for the first time.

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