CARDENOLIDES OF THE SEEDS OF ERYSIMUM CHEIRANTHOIDES L.

I. F. Makarevich and D. G. Kolesnikov

Khimiya Prirodnykh Soedinenii, Vol. 1, No. 5, pp. 363-364, 1965

We have investigated the cardenolide composition of the leaves of Erysimum cheiranthoides L. (treacle mustard) fairly thoroughly [1, 2]. However, only erysimin has so far been obtained from the seeds of this plant [3]. By means of paper chromatography it has been shown [3-5] that the seeds of treacle mustard contain a complex mixture of cardenolides. Consequently, it was of interest to study the cardenolides of its seeds in more detail.

Composition and Properties of the Cardenolides of the Seeds of Treacle Mustard

Substance	Empirical formula	Mp, °C	$[\alpha]_D$ in methanol, deg.	Aglycone	Sugar component*	Yield, % on weight of dry raw material
Strophanthidin	$C_{23}H_{32}O_6$	230—233	+45.2±3	Strophanthidin		0.001
Erysimin	$C_{29}H_{42}O_9$	177—178	+24.8±2	Strophanthidin	D-digitoxose	0.012
Corchoroside A	$C_{29}H_{42}O_9$	154—157	+ 9.3±3	Strophanthidin	D-boivinose	0.001
Deglucoerycordin	$C_{29}H_{44}O_9$	162—164	−21.4±2	Cannogenol	D-gulomethylose	0.016
Helveticosol	$C_{29}H_{44}O_9$	147—151	+27.0±3	Strophanthidol	D-digitoxose	0.005
Glucodigifucoside	$C_{35}H_{54}O_{13}$	188—192	− 7.8±4	Digitoxygenin	D-fucose + D-glucose	0.007
Erychroside	$C_{34}H_{50}O_{13}$	242—248	+17.6±2	Strophanthidin	D-digitoxose + D-xylose	0.016
Erysimoside	$C_{75}H_{52}O_{14}$	171—173	+19.4±2	Strophanthidin	D-digitoxose + D-glucose	0.120
Erychrosol	$C_{34}H_{52}O_{13}$	228—232	+18.9±3	Strophanthidol	D-digitoxose + D-xylose	0.018
Erysimosol	$C_{35}H_{54}O_{14}$	173—176	+22.6±3	Strophanthidol	D-digitoxose + D-glucose	0.011
Erycordin	$C_{35}H_{54}O_{14}$	200—203	−25.4±2	Cannogenol	D-gulomethylose + D-glucose	0.040
Erythriside	$C_{40}H_{60}O_{18}$	194—197	+ 5.2±3	Strophanthidin	D-digitoxose + D-xylose + D-glucose	0.001

* All the monosaccharides mentioned are present in the glycosides in the pyranose form and are linked by β-glycosidic bonds.

We have obtained 12 cardenolides in the pure crystalline state: strophanthidin, erysimin, corchoroside A, deglucoerycordin, helveticosol, glucodigifucoside, erychroside, erychrosol, erysimoside, erysimosol, erycordin, and erythriside, and also one glycoside in the amorphous state, provisionally called IM-17 (Table). All the substances, except for erychrosol, were isolated by adsorption chromatography of purified extracts on alumina. Erychrosol was obtained by means of partition chromatography on cellulose. The methods of purification and chromatography are essentially the same as in preceding communications [1].

The main component of the cardenolides of the seeds of the treacle mustard is erysimoside, while in the leaves of the same plant the component present in predominating amount is erychroside, which we have proposed as a medicinal substance. As compared with the leaves, the seeds of this plant contain considerably more "reduced" glycosides: helveticosol, erychrosol, and erysimosol, i.e., glycosides based on the aglycone strophanthidol.

The treacle mustard seed cardenolides under consideration have four aglycones – strophanthidin, strophanthidol, cannogenol, and digitoxigenin; and six D-monosaccharides – digitoxose, boivinose, gulomethylose, fucose, xylose, -; glucose.

REFERENCES

1. I. F. Makarevich, M. Ya. Tropp, and D. G. Kolesnikov, Farmatsevt. zh. 4, 36, 1960; DAN SSSR, 136, 3, 617, 1961; Med. prom. SSSR, 7, 38, 1961; DAN SSSR, 147, 4, 849, 1962.
2. I. F. Makarevich, et al., Med. prom. SSSR, 7, 23, 1963.
3. N. P. Maksyutina, ZhOKh, 28, 1383, 1958.
4. I. F. Makarevich and I. G. Zoz, Med. prom. SSSR, 5, 19, 1964.
5. Z. Kowalewski, Helv. Chim. Acta, 43, 1314, 1960.

16 June 1965

Kharkov Chemical and Pharmaceutical Scientific Research Institute

THE CRYSTALLINE SUBSTANCE FROM CARPESIUM EXIMIUM C. WINKLER

R. I. Evstratova, K. S. Rybalko, and R. E. Pimenova

Khimiya Prirodnykh Soedinenii, Vol. 1, No. 5, pp. 364-365, 1965

Two sesquiterpene lactones have previously been isolated from Carpesium abrotanoides L.: carpesialactone [1, 2] with bp 200-202/5 mm and composition $C_{15}H_{20}O_3$, and carabrone with mp 90-91°, $[\alpha]_D$ + 116.9° and empirical formula $C_{15}H_{20}O_3$ [3].

The sesquiterpene lactone content of other representatives of the genus Carpesium has not been investigated.

We have studied Carpesium eximium C. Winkler (C. macrocephalum Franch. et Sav.). It has been established provisionally that the leaves of this plant contain γ-lactones. The Carpesium eximium was collected in July 1964 in the south of Primorskii Krai.

Aqueous extraction of the leaves and flower heads [4] gave a colorless crystalline substance with mp 155-157.5°. The thin-layer chromatography of this substance, as well as of its mother liquor, on alumina in the petroleum ether–benzene–chloroform–methanol (5:4:1:2) system gave only one spot with R_f 0.74.

The IR spectrum of the compound obtained had absorption bands of an OH group (3450 cm^{-1}), an α, β-unsaturated γ-lactone (1745, 1672 cm^{-1}), and a double bond (1647 cm^{-1}). Found, %: C 74.20, 74.29; H 8.14, 8.08; mol. wt. 284. Calculated for $C_{17}H_{22}O_3$, %: C 74.45, 8.02; mol. wt. 274.

The presence of a lactone ring was confirmed by the solubility of the substance in alkalies on heating. This substance is readily soluble in alcohol and ether.

On comparing the results obtained for the substance isolated with literature data, we came to the conclusion that it is probably a new, previously unreported sesquiterpene lactone.

REFERENCES

1. T. Karlyone and N. Kawano, Chem. Abst., 44, 1918, 1950.
2. S. Naito, Chem. Abst., 50, 891, 1956.
3. H. Minato, S. Nasaka, and I. Horibe, Proc. Chem. Soc., Apr., 120, 1964.
4. K. S. Rybalko, A. N. Ban'kovskaya, and R. I. Evstratova, Med. prom. SSSR, 3, 13, 1962.

3 May 1965

All-Union Scientific Research Institute for Medicinal and Aromatic Plants

INVESTIGATION OF THE ALKALOIDS OF PEDICULARIS OLGAE

The Structure of Plantagonine and Indicaine

K. L. Lumfullin, P. Kh. Yuldashev, and S. Yu. Yunusov

Khimiya Prirodnykh Soedinenii, Vol. 1, No. 5, pp. 365-366, 1965

We have previously isolated plantagonine and indicaine from the epigeal part of Pedicularis olgae [1]. In the present communication the structure of these alkaloids is considered. Indicaine is a cyclic aminoaldehyde, and oxidation converts it into plantagonine.

The UV spectrum of plantagonine has one maximum at 270 mμ (lg ε 3.12), which is characteristic of alkaloids of the pyridine series [2].