

## Notizen

Chemical Constituents from Hepaticae, XVIII  
**Low-boiling Constituents in the Essential Oil  
 of the Liverwort, *Bazzania pompeana*  
 (Lac.)<sup>1</sup>**

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Liverwort (Hepaticae),  $\beta$ -Pinene,  $\gamma$ -Terpinene,  
 3-Octanone, Camphor, Thujanol

In the course of investigation on chemical constituents of  
 essential oil of the liverwort, *Bazzania pompeana*, the low-  
 boiling constituents were identified as  $\beta$ -pinene,  $\gamma$ -terpinene,  
 3-octanone, camphor and thujanol.

The liverworts (Hepaticae) form a unique group  
 in the plant kingdom and contain characteristic  
 several oil bodies in the cells. Chemical investigation  
 on the essential oil of the liverworts has been under-  
 taken at the first by Müller in 190<sup>2</sup>, but it has  
 been afterwards interrupted owing to the difficulty  
 in collection of a large amount of the plants and to  
 the dissatisfaction in the botanical homogeneity. In  
 the present time, however, the study on the essen-  
 tial oils is placed in active progress by our and  
 other some groups.

The present paper deals with the analysis of low-  
 boiling constituents in the essential oil for *Bazzania  
 pompeana* (Lac.) Mitt. which is a leafy liverwort  
 belonging to the Lepidoziaceae, in connecting with

previous papers on a high-boiling constituents, that  
 is sesquiterpenoids, in this essential oil<sup>3–7</sup>.

The essential oil obtained by steam distillation  
 of the plant was fractionated to separate a low-  
 boiling fraction, which exhibited five peak on gas  
 chromatogram. These constituents were identified as  
 $\beta$ -pinene,  $\gamma$ -terpinene, 3-octanone, camphor and  
 thujanol by measuring mass spectra with GC-MS  
 and gas chromatographic comparison with authentic  
 samples. The relative contents of these components  
 were as listed in Table.

This is the first instance in which these low-  
 boiling constituents were detected in liverworts.

### Experimental

#### Essential oil of the liverwort

The liverwort, *B. pompeana*, was collected at  
 mountains within easy reach of Hiroshima Pre-  
 fecture in June 1971, and the whole plant was  
 distilled with steam to obtain an essential oil. The  
 aqueous distillate was also extracted with ethyl ether  
 and the extract, after evaporation of the solvent,  
 was added to the essential oil. The essential oil thus  
 obtained,  $\alpha_D^{25} + 34.7^\circ$ ,  $n_D^{25} 1.5073$ ,  $d_4^{25} 0.9397$ , was  
 fractionated through a spinning distillation column  
 at reduced pressure of 30 mm Hg to give a low-  
 boiling fraction distilled at 70–90 °C in a yield  
 of about 3% to the essential oil, whose constituents  
 were examined.

#### Identification of $\beta$ -pinene, $\gamma$ -terpinene, 3-octanone, camphor and thujanol

The analysis of the fraction was carried out by  
 using a combined apparatus of a mass spectrometer  
 and a gas chromatograph in connection with a sepa-  
 ration column packed with 3% Silicon SE-30 on  
 Diasolid L.  $\beta$ -Pinene<sup>8</sup>,  $\gamma$ -terpinene<sup>8</sup>, 3-octanone<sup>9</sup>,  
 camphor<sup>10</sup> and thujanol<sup>11</sup> were identified on the  
 basis of agreement of the mass spectra with  
 authentic ones. The identity of these compounds  
 was further confirmed in admixing with authentic  
 samples on gas chromatography with two separation  
 columns of 3% SE-30 on Diasolid L and 3% PEG  
 6000 on Diasolid L.

Table. Low-boiling constituents of the essential oil of *Baz-  
 zania pompeana*.

Compound	Relative content [%]*	Molecular ion	Base ion
$\beta$ -pinene	6.5	<i>m/e</i> 136	<i>m/e</i> 93
$\gamma$ -terpinene	5.4	136	93
3-octanone	71.5	128	99
camphor	2.5	152	95
thujanol	4.7	154	93

\* Relative content was calculated on relative peak areas in  
 the gas chromatogram of the low-boiling fraction.



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