

PHYTOCHEMICAL REPORTS

ISOLATION OF BEAUVERICIN FROM *PAECILOMYCES FUMOSO-ROSEUS*

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Key Word Index—*Paecilomyces fumoso-roseus*; fungi; beauvericin; depsipeptide.

Plant. *Paecilomyces fumoso-roseus*. **Source.** Centraalbureau voor Schimmelcultures, Baarn, The Netherlands. **Importance.** Entomopathogenic fungus. **Previous work.** Morphological and taxonomical studies only. **Present work.** We wish to report the isolation of a depsipeptide, beauvericin, hitherto isolated only from *Beauveria bassiana* [1], this is also an entomopathogenic fungus.

Identification of metabolites. The residue (46 g), was partitioned between H₂O (1 litre) and CHCl₃ (4 l.). After drying (Na₂SO₄) the CHCl₃ phase was evaporated, Residue dissolved in the smallest amount of CHCl₃ and chromatographed on Si gel (70 × 7.5 cm) using MeOH in CHCl₃ (0 to 4%), fractions being examined by TLC (CHCl₃-MeOH 9:1) and pooled accordingly. After a fraction containing mixtures of triglycerides (1.8 g), free fatty acids (8 g) and steroids (0.5 g, mainly ergosterol), a single crystalline compound was obtained (2.4 g) which was identified as beauvericin on the basis of elemental analysis, MS, NMR and rotatory power measurements; all the data were in good agreement with those reported in the literature [1,2].

EXPERIMENTAL

Culture. The strain of *Paecilomyces fumoso-roseus* was grown for 3 days at 27° in submerged culture in the following medium: peptone Difco (1% w/v), yeast-extract (0.2% w/v), dextrose (5% w/v) in H₂O. The fungal mycelium (1.5 kg) was filtered, washed with H₂O, and dried under suction, and then extracted with Me₂CO (3 × 10l); the combined extracts were taken to dryness.

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DEPSIDES FROM *LOBODIRINA MAHUIANA*

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Key Word Index—*Lobodirina mahuiana*; Roccellaceae; Lichen; depsides; atranorin.

Plant. *Lobodirina mahuiana* Follm. was collected on rock surfaces in Quebrada Las Lechuzas, Fray Jorge National Park, Coquimbo province, Chile on 30 March, 1974, and identified by J. Redón by comparison with isotype specimens.

Isolation and characterization of the compounds. The dry material (60 g) was first extracted with

boiling Et₂O for 24 hr. The residue was taken to dryness and washed with acetone. Lecanoric acid (748 mg; 1.24%) and roccellic acid (96 mg, 0.16%) were crystallized by known methods [1] and identified by direct comparison with authentic material by TLC [2,3], mp, mmp and IR spectra [4]. Traces of atranorin were found.

A second extraction with acetone gave atranorin (102 mg, 0.17%) crystallized from chloroform-petrol [1] and identified in a similar manner as the other reported substances. Traces of lecanoric acid were identified by TLC.

This is the first time that the presence of atranorin has been noted in the Roccellaceae.

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many, for the authentic samples of lecanoric and roccelic acids and atranorin from Zopf's collection.

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TWO NEW POLYSACCHARIDES FROM *COLPOMENIA SINUOSA*

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Key Word Index—*Colpomenia sinuosa*; Phaeophyceae; Scytosiphonales; sulphated polysaccharides; glucuronomannogalactan.

Many brown algal species contain sulphated polysaccharides other than fucoidan. Larsen *et al.* [1] have reported the isolation of a fucose-containing polysaccharide, ascophyllan, from *Ascophyllum nodosum*. This polysaccharide contained 25.2% fucose, 26% xylose, 19.2% sodium glucuronate, 12% ester sulphate, and 12% protein. Another sulphated polymer, glucuronoxylofucan, containing L-fucose (49%), D-xylose (10%), D-glucuronic acid (11%), sulphate (20%), and protein (3.8%) has also been isolated from *Ascophyllum nodosum* [2]. Furthermore, a soluble complex, extracted from *Ascophyllum nodosum* [3], contained fucose, xylose, galactose, traces of mannose, glucuronic, mannuronic and guluronic acids, half-ester sulphate and traces of firmly bound protein. More recently, Abdel-Fattah *et al.* [4] have reported the isolation of sargassan, a sulphated heteropolysaccharide from *Sargassum linifolium*, containing glucuronic acid, galactose, mannose, xylose and fucose in addition to 12.2% SO_4^{2-} and 3.85% protein. Mian and Percival [5] have separated 'fucans' from *Himanthalia lorea*, *Bifurcaria bifurcata*, and *Padina pavonia*; these were characterized by their variable proportions of fucose, xylose, glucuronic acid, galactose and

sulphate half ester. The present note describes the isolation of two new sulphated polysaccharides from *Colpomenia sinuosa*.

The percentage composition of *Colpomenia sinuosa* was found to be: 24.31% ash, 12.92% crude protein, 11.06% total lipids, 5.51% mannitol, 3.11% laminaran, 19.79% alginic acid and 13.38% acid-extractable polymer [6]. No LM carbohydrates were found in the alcoholic extract of alga after removal of mannitol. Acid hydrolysis of the algal material and PC of the hydrolysate gave mannuronic, guluronic, and glucuronic acids, their lactones, in addition to galactose, glucose, mannose, xylose and fucose. Further chromatographic analysis revealed the sugar components of the isolated alginic acid and the acid-extractable polymer [6]. Mannuronic and guluronic acids were identified as the components of alginic acid, while glucuronic acid, galactose, mannose, xylose and glucose in addition to fucose were found to construct the acid-extractable polymer [6].

The method of Black *et al.* [6], for fucoidan extraction, was modified to fractionate the acid-extractable polymer into water soluble and water insoluble forms, in the ratio of 1:2, respectively.