Nomenclature of a Class of Biologically Active Mould Metabolites: the Cytochalasins, Phomins, and Zygosporins

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A systematic nomenclature based on the generic name cytochalasan is proposed for the cytochalasins, phomins, and zygosporins.

A SERIES of related biologically active mould metabolites have been isolated in our laboratories and their structures have been elucidated independently by the three groups.[1-11] The compounds are characterised by a highly substituted hydrogenated isoindole group, of known absolute configuration, to which is fused a macrocyclic ring which is either carbocyclic, a lactone, or a cyclic carbonate. Hitherto the compounds have been named either according to their origin or on the basis of their biological activity; thus the metabolites isolated from a *Phoma* sp., strain S 298, have been called phomins,[1,2] those from *Zygosporium masonii* the zygosporins,[7,8] and those from *Helminthosporium dematioideum*, *Metarrhizium anisopliae*, and *Rosellinia necatrix* the cytochalasins (cytos = cell; chalasis = relaxation).[3-6] Since some of these trivial names overlap we propose a systematic nomenclature for the compounds, based on the following rules:

(1) The skeleton of the perhydroisoindole unit, including the macrocycle and the *C*-substituents of the isoindole system, except for the phenyl ring, is named cytochalasan. The number of atoms in the macrocycle, including the atoms common to it and the isoindole ring, is indicated by a number in square brackets preceding the name cytochalasan.

(2) The absolute configuration of the isoindole system is established and does not require specification. For the substituents in the macrocycle, chirality may be designated by use of the symbols *R* and *S*.

(3) The clockwise numbering system indicated in formula (I) is used for designating the positions of substituents on the macrocycle and additional functional groups attached to the isoindole system.

(4) Oxygen atoms which are part of the macrocycle are designated by the prefix oxa- with the appropriate locant.

(5) Superscripts *c* and *t* respectively indicate *cis* and *trans* geometry of olefinic double bonds.

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[10] Y. Tsukuda, M. Matsumoto, H. Minato, and H. Koyama, *Chem. Comm.*, 1969, 41.
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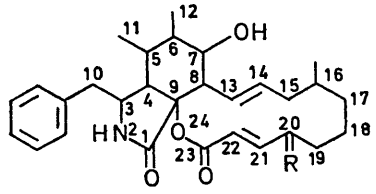
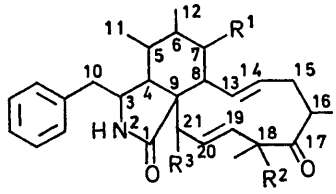
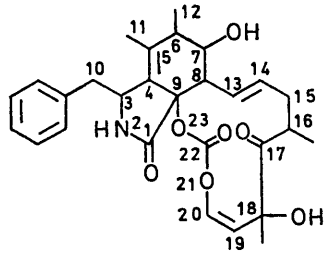


(I) $\Delta^{4,5}$ R = H,OH
(II) $\Delta^{6,12}$ R = H,OH
(III) $\Delta^{6,12}$ R = O



(IV) $\Delta^{5,6}$ $R^1 = R^2 = OH$, $R^3 = OAc$
(V) $\Delta^{6,12}$ $R^1 = R^2 = OH$, $R^3 = OAc$
(VI) $\Delta^{6,12}$ $R^1 = R^2 = R^3 = OH$
(VII) $\Delta^{6,12}$ $R^1 = R^3 = OAc$, $R^2 = OH$
(VIII) $\Delta^{6,12}$ $R^1 = OH$, $R^2 = H$, $R^3 = OAc$
(IX) $\Delta^{6,7}$ $R^1 = H$, $R^2 = OH$, $R^3 = OAc$



(X)

Trivial name	Formula	Systematic name
Cytochalasin F	(I)	(7*R*,16*R*,20*R*)-7,20-Dihydroxy-16-methyl-10-phenyl-24-oxa[14]cytochalasa-4(5),13′,21′, triene-1,23-dione
Phomin = Cytochalasin B	(II)	(7*S*,16*R*,20*R*)-7,20-Dihydroxy-16-methyl-10-phenyl-24-oxa[14]cytochalasa-6(12),13′,21′-triene-1,23-dione
Dehydrophomin = Cytochalasin A	(III)	(7*S*,16*R*)-7-Hydroxy-16-methyl-10-phenyl-24-oxa[14]cytochalasa-6(12),13′,21′-triene-1,20,23-trione
Cytochalasin C	(IV)	(7*S*,16*S*,18*R*,21*R*)-21-Acetoxy-7,18-dihydroxy-16,18-dimethyl-10-phenyl[11]cytochalasa-5(6),13′,19′-triene-1,17-dione
Cytochalasin D = Zygosporin A	(V)	(7*S*,16*S*,18*R*,21*R*)-21-Acetoxy-7,18-dihydroxy-16,18-dimethyl-10-phenyl[11]cytochalasa-6(12),13′,19′-triene-1,17-dione
Zygosporin D	(VI)	(7*S*,16*S*,18*R*,21*R*)-16,18-Dimethyl-7,18,21-trihydroxy-10-phenyl[11]cytochalasa-6(12),13′, 19′-triene-1,17-dione
Zygosporin F	(VII)	(7*S*,16*S*,18*R*,21*R*)-7,21-Diacetoxy-16,18-dimethyl-18-hydroxy-10-phenyl[11]cytochalasa-6(12),13′,19′-triene-1,17-dione
Zygosporin E	(VIII)	(7*S*,16*S*,21*R*)-21-Acetoxy-16,18-dimethyl-7-hydroxy-10-phenyl[11]cytochalasa-6(12),13′, 19′-triene-1,17-dione
Zygosporin G	(IX)	(16*S*,18*R*,21*R*)-21-Acetoxy-16,18-dimethyl-18-hydroxy-10-phenyl[11]cytochalasa-6(7),13′, 19′-triene-1,17-dione
Cytochalasin E	(X)	7,18-Dihydroxy-16,18-dimethyl-10-phenyl-21,23-dioxa[13]cytochalasa-4(5),13′,19′-triene-1,17,22-trione

The three known skeletons are 24-oxa[14]cytochalasan, [11]cytochalasan, and 21,23-dioxa[13]cytochalasan.

The system of numbering chosen allows the assignment of the same locants to that part of the molecule which is common to all ten metabolites.

The names of the known metabolites are listed in the Table.

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