Ceramides from Marine Organisms and Recent Developments on Ceramides

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Sphingosine (2-amino-4-alkene-1,3-diol), sphinganine (dihydrosphingosine), their amides with fatty acids of 16 to 26 carbon atoms (ceramides) and closely related compounds are important membrane components in both plant and animal cells. Different polar head groups are often found attached to the hydroxyl group at C-1 of the sphingosine base. They appear to participate in cell regulatory functions and transmembrane signalling.

Studies on ceramides have lately gained considerable momentum due to their incredible bioactivity. Some of them are found to be effective against...
AIDS and HIV related diseases and for the treatment of disorders (e.g. multiple sclerosis) caused by demyelination while others act as antileukemic, SR Ca\(^{2+}\) ATPase activators, etc.

In recent years ceramides have also been found in the extracts of some marine organisms such as algae (blue, green, symbiotic microalgae), sponge and star fish. Our efforts in search for bioactive components from marine specimens of the Eastern coast of the Bay of Bengal adjoining West Bengal also resulted in the isolation of a few interesting ceramides. Thus, a soft coral (*Nepthea* sp) and a sea worm have afforded (+)-erythro-2-amino-4\(\beta\)-, 8\(\beta\)-octadecadiene-1,3-diol \(N\)-palmitate while a pair of clams (*Solen brevis* and *Barnea Candida*) gave 2-amino-4\(\beta\)-octadecaene-1,3-diol \(N\)-palmitate. Chemical studies on a holothuroid (*Thorsonia investigatoris*) resulted in the isolation of a pair of ceramide 1-glucosides (cerebrosides) derived from 2-amino-4-alkene-1,3-diol and \(\alpha\)-hydroxy fatty acids. Interestingly, one of them incorporated an isopropyl moiety on one of the two fatty tails.
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As a part of our investigation in search of bioactive components from marine sources a pair of holothuroids and a pair of polychaetes collected from the coastal Bay of Bengal adjoining West Bengal have been investigated. The crude extracts of these organisms had weak to moderate toxicity in brine-shrimp assays. During the chemical investigation of these organisms a few ceramides and cerebrosides as well as an isoxazole were obtained as the interesting metabolites along with a few ubiquitous compounds.

An apparently new galactocerebroside derived from 2-amino-4-alkene-1,3-diol was found in the polychaete Chloea perva while (±)-erythro-2-amino-4E, 8E-octadecadiene-1, 3-diol N-palmitate was found in the polychaete Neris sp. The holothuroid Thorsonia investigatoris yielded a mixture of three new glucocerebrosides derived from 2-amino-4-alkene-1,3-diol and, interestingly enough, one of them had an isopropyl moiety at the end of one of the fatty tails. The defensive secretion of a sea cucumber has afforded 3-carbomethoxy-5-methylisoxazole which has lately been found also in two terrestrial plants.
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As a part of our continued interest in search of bioactive components from marine sources, a few organisms from the eastern coast of the Bay of Bengal adjoining Digha were collected and are being investigated. Among them the bivalvia *Meretrix metetrix* afforded 2-alkyl-4-hydroxymethyl-dioxolanes, the silt coral *Nephthea* species furnished ceramides, the polychaete *Chloea purva* yielded galactocerebrosides while the holothuroids *Thorsonia investigatories* and *Cavernularia* sp. gave glucocerebrosides and *N*-acyl-3-alkyloxy-2-aminopropanols, respectively, as novel metabolites in addition to a number of other ubiquitous components.