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ISOLATION AND X-RAY CRYSTAL STRUCTURE OF A NOVEL BROMO-COMPOUND FROM TWO MARINE SPONGES[1]

G Cimino[ϕ], S. De Rosa[ϕ], S. De Stefano[ϕ],
L Mazzarella[+], R Puliti[+ϕ] and G Sodano[ϕ]

[ϕ]Istituto per la Chimica di Molecole di Interesse Biologico del C N. R
Via Toiano n. 2, Arco Felice, Naples, Italy
[+]Istituto Chimicodell'Università, Via Mezzocannone n 4, Naples, Italy

Abstract - A novel bromo-compound, $C_{11}H_{10}N_5O_2Br$, has been isolated from the sponges *Axinella verrucosa* and *Acanthella aurantiaca* The structure was determined as *2* on spectral grounds and by X-ray analysis

Several C_{11}-N_5 compounds containing a guanidine moiety and slightly different carbon framework have been isolated from marine sponges[2,3] The latest addition to this group, which may have a common biosynthetic precursor, is a "yellow compound" (*1*) recently isolated from the sponge *Phakellia flabellata*[4]

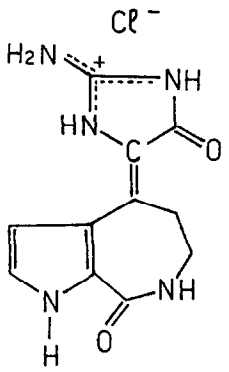
We wish to report now the isolation and X-ray crystal structure of the related compound *2* isolated from the Mediterranean sponge *Axinella verrucosa* and from the Red Sea sponge *Acanthella aurantiaca*, which also contain considerable amounts of the biogenetically related oroidin[2].

The sponges were extracted with acetone and, after evaporation of the solvent, the remaining water was extracted with diethyl ether and then with n-butanol The butanolic extracts were suspended in methanol and the insoluble material was collected by filtration and purified by repeated precipitations from hot methanol and finally from hot water to afford *2* (0 5% dry weight from *Axinella verrucosa*; 0 4% dry weight from *Acanthella aurantiaca*) as a yellow amorphous solid, pure by t l c. (n-BuOH/AcOH/H_2O, 60 15 25)

2, $C_{11}H_{10}N_5O_2Br$ (elemental analysis and high resolution m s.), insoluble in the common organic solvents with the exception of dimethyl sulfoxide, exhibits absorption maxima in the u.v spectrum [λ_{max} (MeOH) 345 (ε 18,000), 272 (12,700), 265 (12,600) and 230 nm (11,900), λ_{max} (MeOH-KOH) 388,277 and 238 nm] strongly reminiscent of those of the yellow compound *1*[4].

In addition, the diacetyl derivative of *2*, M^+ 407 and 409, obtained with acetic anhydride (30 min, reflux) and purified by precipitation from $CHCl_3$-MeOH (1 1), also shows the characteristic shift to the red in the u.v spectrum [λ_{max} (MeOH) 387 (ε 18,700), 300 (8,000), 287 (9,200) and 234 nm (15,700)]

The n.m r data of *2* are in accord with the depicted structure the p.m r spectrum [$(CD_3)_2SO$], besides D_2O exchangeable protons at δ 7.92, 10.52 and 12 20, shows only a broad singlet at δ 3 3 due to the 8- and 9-CH_2 and a singlet at δ 7 28 assignable to the proton on C-3 In the c m r.spectrum[5], C-2 resonates at δ 103 4, while in the parent debromo compound this



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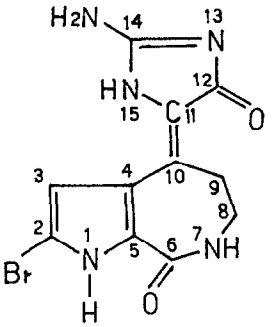
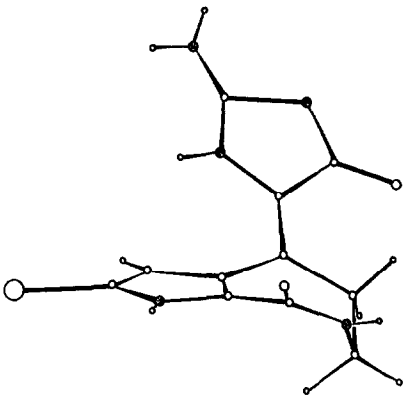


2



3

carbon was found at δ 122 97[4]

Since *1* and *2* belong to a new class of compounds, in order to define unambiguously their structures we tried to obtain a crystal of *2* suitable for X-ray analysis Attempts to crystallize *2* from several solvents always resulted in the recovery of amorphous material However when the mother liquors of the butanolic extract of *Acanthella aurantiaca* were subjected to LH-20 column chromatography (MeOH) we obtained in several fractions pure *2* which slowly crystallized at room temperature

Crystal Data $C_{11}H_{10}N_5O_2Br\ CH_3OH$, Mw 356.07, monoclinic, a = 11.943(1), b = 16,252(2), c = 7 253(2) Å, β = 93,43(2)°, V = 1405,2 Å^3, ρ_c = 1 69 g cm^{-3}, z = 4, space group $P2_1/n$, [λ(Cu Kα)= 1 54178 Å]. The structure was solved by Patterson and heavy-atom method,and refined by difference Fourier and full-matrix least-squares procedures to R factor = 0.042[6] on 1992 independent non-zero reflections collected ($\vartheta \leq 70°$) on an ENRAF-NONIUS CAD-4F diffractometer on line on a PDP 11/34 computer All non-hydrogen atoms have been refined anisotropically Fig *3* shows a view of a single molecule All the hydrogen atoms were located in a difference Fourier map.

Details of the results of the crystallographyc work will be published elsewhere

2 is moderately cytotoxic *in vitro* (KB cells), but it is inactive on P 388 leukemia *in vivo*.

REFERENCES AND NOTES

1.- This work has been supported by "Progetto Finalizzato Chimica Fine e Secondaria", CNR, Roma

2 - E E Garcia, L E.Benjamin and R Ian Fryer, *J C S Chem Comm* , 78, 1973

3 - G M Sharma and M B Fairchild, *J Org Chem* , *42*, 4118, 1977

4 - G M Sharma, J S Buyer and M W Pomerantz, *J C S Chem Comm* , 435, 1980

5 - δ [$(CD_3)_2SO$] 29.9 (C-9), 39 9 (C-8), 103 4 (C-2), 113 6 (C-3), 122 3 (C-5), 125 3, 126 5, 126.6 (C-4, C-10, C-11), 157 9 (C-6), 162 1 (C-14), 173 0 (C-12)

6 - Crystallographic coordinates have been deposited with the Cambridge Crystallographic Data Center The X-ray work has been done at "Centro di Metodologie Chimico-Fisiche dell'Università di Napoli".

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