

THE ABSOLUTE CONFIGURATION OF THE AXANE SESQUITERPENES FROM THE SPONGE *AXINELLA CANNABINA*

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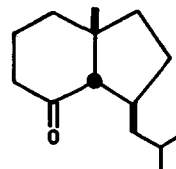
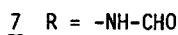
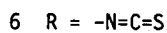
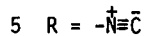
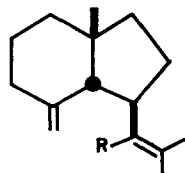
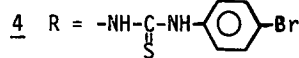
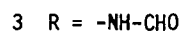
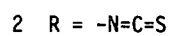
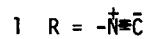
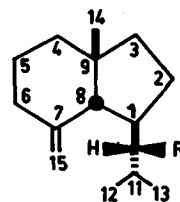
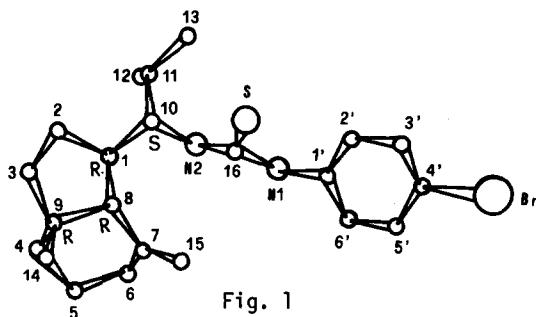
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In previous papers²⁻⁴ we reported isolation and structure determination of the sesquiterpenes of the sponge *Axinella cannabina* axisonitrile-1, axisothiocyanate-1, axamide-1, axisonitrile-4, axisothiocyanate-4 and axamide-4 having the peculiar axane skeleton. Now on the basis of X-ray and CD evidence we have established their absolute configuration depicted in 1, 2, 3, 5, 6 and 7, respectively.

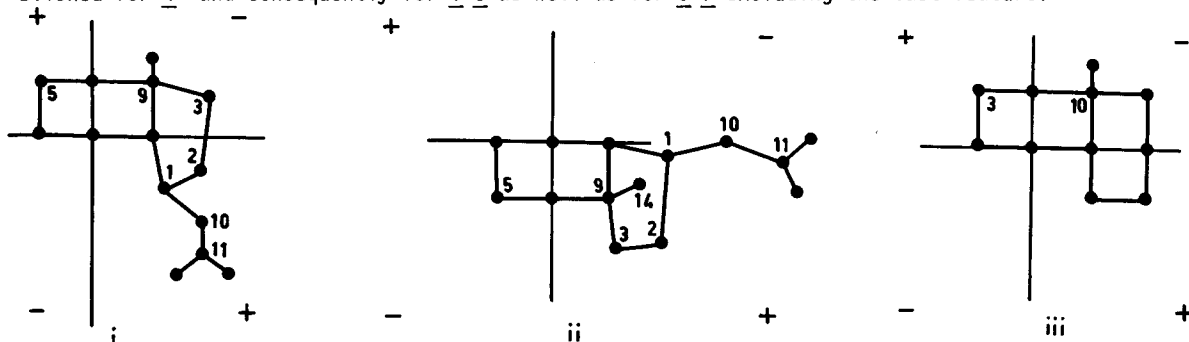
In spite of our efforts to grow other good single crystals suitable for X-ray diffractometric measurements, it was possible to obtain only the very poor crystals of the derivative 4 (prepared by reaction of 2 with p-bromoaniline; M^+ 434 m/e, m.p. 154-6° (from MeOH), $[\alpha]_D^{25} -43^\circ$). Therefore only the relative configuration of the chiral centres of the molecule could be determined by crystal structure analysis.



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The crystals belong to the $P2_1$ space group, $a=10.66(2)$, $b=9.85(2)$, $c=22.13(4)$ Å, $\beta=92.1(1)^\circ$, with two crystallographically independent molecules. The R factor for 1900 independent non zero reflections is 0.10 with anisotropic thermal factor only for Br and S atoms and not including the contribution of the hydrogen atoms. The major difference between the two independent molecules is essentially due to a small difference (17°) in the rotation angles S-C(16)-N(1)-C(1'). In fig. 1 is reported the molecular model of 4.

The *cis* fusion of the hydrindane skeleton, the *cis* relation between the angular methyl and the side chain and the configuration at C(10) relative to the other chiral centres were so established for 4 and consequently for 1-3 as well as for 5-7 excluding the last feature.



The absolute configuration of the axane sesquiterpenes was achieved through CD measurements performed on the ketone 8 obtained from 1 as previously reported². The positive Cotton effect ($[\epsilon]_{304} +1220$, $c=3 \times 10^{-3}$, MeOH, $a=+15$) indicates that 8 has the 9(R),8(R),1(R),10(S) configuration as shown⁵ by the octant projections of the two conformers of the enantiomer having this configuration (i and ii). Therefore the absolute 9(R),8(R),1(R),10(S) configuration 1 must be assigned to axisonitrile-1. Because the chemical correlation established²⁻⁴ among this sesquiterpene and axisothiocyanate-1, axamide-1, axisonitrile-4, axisothiocyanate-4 and axamide-4, the absolute configuration represented by formulas 2, 3, 5, 6, 7, respectively, must be attributed to these latter.

REFERENCES AND NOTES

1. This work was supported by the Consiglio Nazionale delle Ricerche - Roma.
2. F.Cafieri, E.Fattorusso, S.Magno, C.Santacroce, D.Sica, *Tetrahedron*, **29**, 4259 (1973).
3. E.Fattorusso, S.Magno, L.Mayol, C.Santacroce, D.Sica, *Tetrahedron*, **31**, 269 (1975).
4. A.Iengo, L.Mayol, C.Santacroce, *Experientia*, **33**, 11 (1977).
5. The Cotton effect of i and ii may be safely assumed to be positive on the basis of the dictates of the octant rule. As for i, this statement is supported by the observation that (+)-10-methyl-decalone-1 exhibits⁶ a positive Cotton effect ($a=+11$), in spite of the lack, in the lower-right octant of the projection iii, of the side chain present in i.
6. C.Djerassi, D.Marshall, *J. Am. Chem. Soc.*, **80**, 3986 (1958); W.Moffitt, R.B.Woodward, A.Moscowitz, W.Klyne, C.Djerassi, *J. Am. Chem. Soc.*, **83**, 4013 (1961).