

On the assumption that an interchange is involved in the chain of III and that a normal set of chromosomes was contributed by the male gamete, the deficiency, therefore, involves portions of two chromosomes. The recovered monosomes in the progeny of 57-4 haploids represent about 2 to 3% of the analyzed population, which is a rather low frequency. The 57-4 haploids, therefore, are not a very efficient source for recovering whole chromosome deficiencies. Since Sears⁸ found 16 monosomes among the 13 immediate progeny of a wheat haploid pollinated with normal pollen, it was disappointing to find such a low frequency of monosomes in the progeny of the cotton haploids. It is possible that since the haploid-including mechanism is genetically controlled⁸ and expressed in haploids, as well as diploids, the mechanism itself may preclude a high production of monosomes.

Other chromosomal structural types recovered from the cotton haploid were telosomes, trisomes, and translocations. Since trisomes and translocations were also recovered in the progeny of the wheat haploid, the cotton and wheat results are related. Therefore, it is assumed that the

aberrations recovered in the progeny of the cotton haploids originated in a manner similar to that proposed by Sears⁹ for the origin of the aberrations recovered in the progeny of the wheat haploid.¹⁰

1. Meta, S. Brown and Endrizzi, J. E., *Am. J. Bot.*, 1964, 51, 108.
2. Sears E. R., *Mo. Agric. Exp. Sta. Res. Bull.*, 1954, pp. 572-59.
3. Clausen, R. E. and Cameron, D. R., *Genetics*, 1944, 29, 447.
4. Rajhathy, T. and Dyck, P. L., *Can. J. Genet. Cytol.*, 1964, 6, 215.
5. Andrews, G. T. and McGinnis, R. C., *Ibid.*, 1964, 6, 349.
6. White, T. G. and Endrizzi, J. E., *Genetics*, 1965, 51, 605.
7. Endrizzi, J. E., Unpublished.
8. Turcotte, E. L. and Feaster, C. V., *Science*, 1963, 140, 1470.
9. Sears, E. R., *Genetics*, 1939, 24, 509.
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ACTION OF ALKALINE HYDROGEN PEROXIDE ON α -METHOXY CHALKONES

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2'-HYDROXYCHALKONES are well known to undergo cyclisation to give flavanones both by acid and by alkali.¹⁻⁶ However, the presence of an α -methoxy group directs the cyclisation to give a coumaran-3-one derivative. Though α -methoxy-2'-hydroxychalkones have been isolated from chalkone condensations which required alkaline conditions, they undergo change if left in contact with dilute alkali for a long time and the products are 2-methoxy-2-benzyl coumaran-3-one derivatives.⁷ The same products are also formed when the chalkones are heated at 200° *in vacuo*.⁸ α , 2'-Dihydroxy chalkones are rather difficult to isolate in chalkone condensations and the product is generally a 2-hydroxy-2-benzylcoumaran-3-one derivative.⁹ Under acidic conditions

demethylation is possible and α -methoxy-2'-hydroxychalkones give two products, *viz.*, 2-methoxy-2-benzyl coumaran-3-one derivative and the corresponding 2-hydroxy compound.⁷⁻¹⁰

2'-Hydroxychalkones undergo oxidation with alkaline hydrogen peroxide called Algar-Flynn-Oyamada oxidation or simply A.F.O. reaction and the nature of the products depends on the substituents and the temperature.¹¹⁻¹² When there is no 6'-substituent in the chalkone, flavonols are the main products; aurones are formed only in small amounts. However, if a 6'-substituent is present and there is no free hydroxyl in 2 and 4 positions, aurones are major products and flavonols are the minor ones. The situation is reversed if there is a free hydroxyl in either 2 or 4 position, though there may be a

6'-substituent. Epoxides were considered earlier¹³ as the only intermediates in the reaction, but a satisfactory mechanism for the formation of all these products has been given very recently by Dean and Podimuang.¹⁴

The influence of α -methoxy group on A.F.O. oxidation was first examined in this laboratory¹⁵ and it was reported that 3-methoxyflavones were formed in good yields. The influence of α -methyl group has more recently been studied by Dean and Podimuang¹⁴ who showed that the product was 2-methyl- α -hydroxy-2-benzyl coumaran-3-one by n.m.r. and i.r. spectra. In view of this observation, the earlier results¹⁵ obtained in this laboratory were checked up, because α -methyl and α -methoxyl should have similar electronic effect.

The oxidation of 2'-hydroxy- α , 4', 6'-trimethoxy chalkone¹⁶ has now been studied first and the product obtained in 70% yield is a colourless compound melting at the same temperature as was recorded earlier.¹⁵ But it shows a much higher carbonyl frequency (1705 cm.^{-1}) in the infra-red spectrum (using nujol mull) than that expected for galangin trimethyl ether (ν_{max} in penta-*o*-methyl quercetin is 1629 cm.^{-1}).¹⁷ This is more in accordance with the coumaran-3-one structure (cf. aurone hydrates¹⁸ have CO frequency at about 1700 cm.^{-1}) which is also supported by the characteristic u.v. spectrum showing an intense peak only at $290\text{ m}\mu$ ($\log \epsilon$, 4.30) (cf. aurone hydrates¹⁸); galangin trimethyl ether should show two bands one at about $250\text{ m}\mu$ and the other at about $320\text{ m}\mu$.¹⁹ Further, the product shows hydroxyl stretching frequency at about 3500 cm.^{-1} which is not possible if it is galangin trimethyl ether. Hence its structure should be taken as 2-benzyl- α -hydroxy-2, 4, 6-trimethoxycoumaran-3-one and not galangin trimethyl ether as considered earlier.¹⁵

Two more α -methoxy-2'-hydroxychalkones have next been studied: they are 2'-hydroxy- α , 4, 4', 6'-tetramethoxychalkone²⁰ and 2'-hydroxy-3-benzyloxy- α , 4, 4', 6'-tetramethoxychalkone.²¹ In these cases also, the products formed are not 3-methoxyflavones but they have the coumaran-3-one structures as shown by u.v. and i.r. spectra. Further work is in progress to

study the influence of substituents but this advance note has been necessitated because of a preliminary communication on a similar work published in the latest *Chemical Communications*²² received by us.

1. Kostanecki, S., Lampe, V. and Tambor, J., *Ber.*, 1904, **37**, 784.
2. Lowenbein, A., *Ibid.*, 1924, **57**, 1515.
3. Saiyad, F. Z., Nadkarni, D. R. and Wheeler, T. S., *J. Chem. Soc.*, 1937, p. 1737.
4. Matsura, S., *Pharm. Bull. Tokyo*, 1957, **5**, 195.
5. Raut, K. B. and Wender, S. H., *J. Org. Chem.*, 1960, **25**, 50.
6. Mulchandani, N. B. and Shah, N. M., *Chem. Ber.*, 1960, **93**, 1918.
7. Eneback, C. and Gripenberg, J., *Acta Chem. Scand.*, 1957, **11**, 366.
8. Molbo, D., Chopin, J. and Chadenson, M., *Bull. Soc. Chem. Fr.*, 1959, p. 454.
9. Grover, S. K., Gupta, V. N., Jain, A. C. and Seshadri, T. R., *J. sci. industr. Res.*, 1960, **19B**, 258.
10. Sukumato, T. T. and Tominaga, T., *J. Pharm. Soc. (Japan)*, 1953, **73**, 1172; *C.A.*, 1954, **48**, 12740.
11. Wheeler, T. S., *Rec. Chem. Progr.*, 1957, **18**, 133.
12. Philbin, E. M. and Wheeler, T. S., In *Recent Progress in the Chemistry of Natural and Synthetic Colouring Matters*, Eds. T. S. Gore, B. S. Joshi, S. V. Sunthakar and B. D. Tilak, Academic Press, New York, 1962, p. 167.
13. Geissman, T. A. and Fukushima, D. K., *J. Amer. Chem. Soc.*, 1948, **70**, 1686.
14. Dean, F. M. and Podimuang, V., *J. Chem. Soc., Lond.*, 1965, p. 3978.
15. Narasimhachari, N., Narayanswami, S. and Seshadri, T. R., *Proc. Ind. Acad. Sci.*, 1953, **37**, 104.
16. Kimura, Y. and Hoshi, M., *Proc. Imp. Acad (Tokyo)*, 1936, **12**, 285.
17. Briggs, L. H. and Colebrook, L. D., *Spectrochim. Acta*, 1962, **18**, 939.
18. Grover, S. K., Jain, A. C. and Seshadri, T. R., *Ind. J. Chem.*, 1963, **1**, 429.
19. Jurd, L., In *The Chemistry of Flavonoid Compounds*, Ed. T. A. Geissman, 1962, p. 112.
20. Kimura, Y., *J. Pharm. Soc. Japan*, 1938, **58**, 415.
21. Anand, N. K., Gupta, S. R., Jain, A. C. and others, *J. sci. industr. Res. India*, 1962, **21B**, 322.
22. Donnelly, D. M. X., Lavin, T. P., Melody, D. P. and Philbin, E. M., *Chem. Comm.*, 1965, No. 19, p. 460.