

ORGANIC CHEMISTRY OF NATURAL
PRODUCTS: RESEARCH PUBLICATIONS

by

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Doctor of Science
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ORGANIC CHEMISTRY OF NATURAL PRODUCTS

Research publications submitted to the University of Adelaide
for the degree of Doctor of Science by R.G.Cooke M.Sc.

PREFACE

The twenty-three publications should be considered in two categories. For the first sixteen papers the candidate is the senior author and is responsible for the initiation, direction and interpretation of the work. In some cases he also carried out all, or a substantial part of, the experimental work. The remainder was done by students under his direction. For the most part these papers describe original chemical investigations of new plant constituents or original contributions to the chemistry of known compounds.

The remaining seven papers should be considered as supplementary. They describe work done by the candidate during a much earlier period as research assistant to Professor A.K.Macbeth. In most of these the candidate was responsible for all, or a substantial part of, the experimental work and in some cases for the initiation and planning of the study.

The candidate has not submitted any of the papers previously for a degree. More detailed notes on the content of the papers are given below.

The first three papers describe extensive studies of the chemistry of the natural pigment dunnione and its derivatives. This work provided proof of the structure of several novel compounds by synthesis and clarified the chemistry of some new reactions. A major part of the experimental work was done by the candidate in addition to the planning and interpretation of the whole investigation.

Paper 4 describes the final proof of the structure of a natural product by synthesis, establishes the structures of certain related compounds and gives an interpretation of

orientation effects in the substitution of quinones. The last theme is further elaborated in paper 10 which also contains methods for the synthesis of natural quinones.

The subject matter of papers 5 and 6 is the isolation, structure determination and synthesis of two new natural products - one of a novel type.

A detailed investigation of a completely new type of natural product is described in papers 7, 8 and 9. This involved much interpretation of spectroscopic analysis, extensive degradation experiments and a series of long synthetic operations for the preparation of new compounds. Much of the experimental work was done personally by the candidate.

The isolation of a new furoquinoline alkaloid and some known analogues is given in paper 11, and a general method for synthesis of this type of alkaloid is set out in paper 12. This method was devised quite independently by the candidate and at the time no other synthesis of this type of alkaloid had been published and their structures were still in doubt. Other syntheses were published almost simultaneously with the first description of this process.

Paper 13 gives an account of a new type of naturally occurring base as well as new isolations of known alkaloids.

Paper 14 is a review but is included because the candidate has given therein some contributions to the structural analysis of natural products- particularly pristimerin and purpurogenone- which have not been published elsewhere.

Paper 15 describes a useful diagnostic test for the recognition of different kinds of anhydride which was derived by the candidate from analysis of spectroscopic results published or provided by many workers.

Paper 16 is a preliminary account of much detailed investigation of the preparation of new kinds of substituted naphthalenes and has resulted in the correction of some errors in structure assignments among this group of compounds.

The second group of papers deal mainly with the chemistry and stereochemistry of constituents of essential oils.

Papers 17 and 21 contain some of the earliest quantitative spectroscopic analysis on two groups of organic compounds, and these have been useful subsequently for the recognition of structural features in many other compounds.

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