

## Introduction

# The evolution of aquatic plants: an introduction and tribute to Cyril Duncan Sculthorpe, author of *The Biology of Aquatic Vascular Plants*\*

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Aquatic flowering plants have long fascinated biologists. Their highly plastic phenotypes, reduced vegetative and reproductive structures, diverse modes of sexual and asexual reproduction, broad distributions, and evolutionary antiquity make them biologically perplexing and evolutionarily intriguing. Cyril Duncan Sculthorpe has been an important participant in the development of our understanding of aquatic plant biology. His book, *The Biology of Aquatic Vascular Plants*, is an invaluable synthesis of information on the biology and structure of aquatic plants that is presented in a clear instructive style. His discussions of plant structure and function have been particularly important in the context of understanding adaptation to the aquatic environment. A plethora of information has been published on the systematics, ecology, and biology of aquatic plants since the publication of Sculthorpe's book. Yet, much of this work remains to be considered in an evolutionary context. Consequently, the significance of the various evolutionary patterns and processes operating in the evolution of aquatic plants remains unclear. The purpose of this volume is to present discussion of a range of topics bearing on the evolution of aquatic plants, and in doing so, identify areas in which future work is needed.

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\*The contributions herein were part of a symposium of the same title that was conducted during the annual meeting of the American Society of Plant Taxonomists, at San Antonio, Texas, USA, in August 1991. Many people, too numerous to mention, have been helpful in providing their insights into what little is known about C.D. Sculthorpe. We are indebted to them. We offer special thanks to Dr. Robert E. Blackburn.

In this volume Barrett et al. consider the diversity of evolutionary processes that occur in aquatic plant populations, and means by which they can be assessed. Several major categories of selective forces that influence the evolution of clonal growth in aquatics are discussed by Grace. Les and Philbrick survey information on hybridization and chromosome number variation in aquatic plants and discuss the implications of their findings for understanding aquatic plant evolutionary processes. Relationships between species diversity in aquatic habitats in temperate versus tropical regions are presented by Crow. Stuckey addresses issues regarding the phytogeography of aquatic and wetland plants in eastern North America. Laushman considers the genetic population structure as it relates to hydrophilous pollination systems. Two contributions consider floral structural evolution in important taxonomic groups: Nymphaeales and Helobiae (Alismatidae). Posluszny and Charlton consider the array of floral structural diversity in the Helobiae. Moseley et al. provide an overview of the evolution of floral vascular structure in the Nymphaeales, and use their data to suggest phylogenetic relationships. As 1992 was the twenty-fifth anniversary of the publication of *The Biology of Aquatic Vascular Plants*, we dedicate this volume to the memory of Cyril Duncan Sculthorpe. Since little is known about Sculthorpe a brief biographic overview is added.

#### A TRIBUTE TO CYRIL DUNCAN SCULTHORPE

Persons with any interest in the biology, ecology, systematics or evolution of aquatic vascular plants have invariably referred to C.D. Sculthorpe's book *The Biology of Aquatic Vascular Plants* (1967, with subsequent printing in 1971 and 1985) (Clovis, 1969; Voss, 1969; Les, 1986; Květ, 1987). In the preface to his book, Sculthorpe stated that it was "written primarily for undergraduate and graduate students" as a textbook. Despite this rather modest intention it has become one of the most important works on aquatic plant biology and an invaluable reference for researchers. The importance of this book is illustrated by its frequent citation in scientific papers pertaining to aquatic plant biology, ecology, systematics and evolution. However, there are remarkably few details known about the author of this important work. To honor this influential but seldom celebrated scientist we offer the following brief glimpse into his life and times.

C.D. Sculthorpe's publication record is somewhat of an enigma. Unlike authors of major works in many fields, his book was not the culmination of a long career accompanied by numerous publications in scientific journals. In fact, except for a chapter on growing aquarium plants in a book focused mainly on tropical fish (Sculthorpe, 1962) *The Biology of Aquatic Vascular Plants* was the only published work that he ever produced.

Unfortunately, little information is available on the life of Sculthorpe. Correspondence with Sculthorpe's friend and contemporary Dr. Robert E. Blackburn has been invaluable in providing details of Sculthorpe's life. Dr. Blackburn's letters are quoted heavily in what follows.

Sculthorpe was born on 4 August 1939, the younger of two sons of Mr. and Mrs. Herbert Sculthorpe, Bolton, Lancashire, UK. Sculthorpe attended Bolton School, a prestigious preparatory school. "Duncan Sculthorpe (or "Scully" as he inevitably came to be known) came to Bolton School in September 1947 at the age of eight, joining the first form (Prep IA) of the Preparatory School...before proceeding to form III of the 'big' school." Mr. Alan D. Walsh, the preparatory school's headmaster to 1950, was a great admirer of the immaculately finished written work and natural aptitude of Duncan Sculthorpe.

"Physically [he was] fair-haired, fair-skinned and blue-eyed... His dress, appearance, and persona matched his school work; there never seemed to be anything remotely out of place in either. Sharply observant, he had a tart sense of humour, but very rarely allowed his iron self-control to become ruffled.

"Clearly,...there were exceptional powers of organisation and efficiency in the boy's work, which ensured his pre-eminence throughout his school career. Contemporaries recall him as cheerful by disposition, but always completely methodical in his approach to anything he did. The all-around quality of his mind was widely observed, and he was unusually articulate from an early age.

"As Duncan's school career progressed, it became apparent that his academic pathway might lead him equally towards either humanities or sciences. ...it was the sciences, especially biology, which eventually claimed him. His mentor in Biology was Mr. H. Trevor Lane (1909–1982), head of biology at the school. In January 1957, Duncan...was awarded a Major Scholarship in Biology by Trinity Hall, Cambridge [University], to read for the Natural Sciences...beginning in October 1957." Sculthorpe went to Cambridge where he specialized in genetics and finished his degree in 1960. Immediately after, he gained a post as Assistant Lecturer in Biology at Salford Technical College (later to become the Salford University), and soon thereafter was promoted to Lecturer. In 1965 he was appointed to a lectureship position at West Ham College of Technology (later to become part of North East London Polytechnic), and 2 years later was promoted to a senior lectureship in Botany and Genetics. Sculthorpe's title is 'Dr.' on the title page of Sculthorpe (1962). However, this seems to have been in anticipation of his actually completing the degree. Sculthorpe was registered for a Ph.D. in genetics at the time that he contracted the leukemia from which he died on 5 April 1969, at age 29.

Disappointingly little has emerged about Sculthorpe's professional side. How his interest in aquatic plants developed and what compelled him to write his influential book remains a mystery. The local newspaper in Sculthorpe's home town of Bolton reported (7 August 1962) that at age 23 Sculthorpe

“has been preparing his book on the study of hydrophytes for some time now,” which suggests that he started working actively on the book while in his early twenties. This same article quoted Sculthorpe as stating that he became interested in aquatic plants while “in the sixth form at Bolton School.”

Nothing concerning Sculthorpe’s professional interactions in the field of botany is known. Although he was elected to the Linnean Society of London on 22 April 1965 it is not known what other ties he had with the botanical community.

Sculthorpe’s ‘Biology’ is without question a superb reference on water plant biology, meticulously organized, referenced, and written. However, Sculthorpe was not (as some have criticized) merely a competent bibliographer, but was extremely well-versed in the biology of water plants. This is perhaps best evidenced by the originality evident in his 93 page chapter on Exotic Aquarium plants (Sculthorpe, 1962) which is entirely unreferenced. That chapter reflects an outstanding capacity of knowledge on many aspects of aquarium plant cultivation including growth, reproduction, ecology, and taxonomy. In both his published works, Sculthorpe’s numerous photographs of development stages, morphological peculiarities, etc. document his keen scientific interest and exceptional powers of observation. We can only imagine what achievements might have come from this exceptional young man had he lived beyond 29th year. It is indeed tragic that a biologist of such ability and promise passed away so young.

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