

Cambridge University Press

0521020859 - The Digestive System in Mammals: Food, Form and Function

Edited by D. J. Chivers and P. Langer

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However well the anatomy of the gastro-intestinal tracts of a wide range of animal species are described and quantified, there can be no real explanation of observed patterns without consideration of the mechanical and chemical properties of the food consumed and the digestive stages involved in its processing. This book aims to integrate findings from the many different types of investigation of mammalian digestive systems into a coherent whole.

Using the themes of food, form and function, researchers discuss models of digestive processes, linking this with evolutionary aspects of food use. Macroscopic and ultrastructural studies of the gastro-intestinal tract are also presented, as are physiological, ecological and biochemical aspects of the digestion of different food types. The book ends with an integrative chapter, bringing together the themes running through earlier sections.

The book will be of interest to researchers and graduate students of anatomy, zoology, physiology, ecology, evolution and animal nutrition.

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Workshop participants by the main gate of Selwyn College, Cambridge, March 1992.
Back (left to right): Peter Lucas, Bruno Simmen, Robert Snipes, Mike Perrin, Neill Alexander, Reg Moir, Göran Björnhag, Marcus Young Owl, Ian Hume, David Chivers.

Front (left to right): Marcel Hladik, Peter Langer, Carlos Martínez del Río, Katie Milton, George Batzli, Steve Cork, Takashi Sakata.

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Dedication

A quarter of a century ago, Professor Reg J. Moir of the University of Western Australia, Nedlands, wrote the following lines:

The development of the ruminant and other ruminant-like digestive systems is surely a progressive evolutionary pathway enabling life to be lived under wider, more difficult, and even inhospitable nutritional environments.

Moir, R. J. (1968). Ruminant digestion and evolution. In *Handbook of Physiology*, Section 6, Vol. 5, pp. 2673–2694. Washington DC: American Physiological Society.

These words, and the paper in which they were published, initiated the comparative type of investigation of the digestive system, not only of ruminant and ruminant-like herbivores but also of mammals in general. As this volume tries to give an overview of the state of the art, we wish to dedicate this book to its real initiator, whose presence at the Workshop, with his wife Shirley, was a special pleasure:

Professor Reg Moir

It was Reg who drew our attention to the words of Sir Geoffrey Vickers, as a guidance to our deliberations:

Even the dogs may eat the crumbs which fall from the rich man's table; and in these days, when the rich in knowledge eat such specialised food at such separate tables, only the dogs have a chance of a balanced diet.

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Preface

We started corresponding early in 1988 with exchange of reprints and discovered that we had very similar anatomical interests and a shared desire to promote interdisciplinary discussion to resolve problems of mutual interest. However well the anatomy of the gastro-intestinal tract of a wide range of animal species is described and quantified, there can be no real explanation of observed patterns without consideration of the mechanical and chemical properties of the different foods consumed, and the digestive processes – mechanical and chemical – involved in their processing.

We met in Cambridge in May 1989 in the gardens of Selwyn College and continued discussions over dinner in Hall. We resolved to hold a workshop in Cambridge, from which a book would result, on the Form, Function and Evolution of the Digestive System in Mammals. Plans were developed, with the target of April 1991 once September 1990 proved unpopular among the 30 or so prospective participants – a blend of anatomists, physiologists, zoologists, botanists, ecologists and anthropologists. Lack of funds caused postponement for a further 12 months and it was only possible to hold the Workshop through the enthusiasm and determination of the participants in finding their travel (and some subsistence) money and with help from Dalgety plc and Cambridge University Press who covered most of the costs of the 4 days in Cambridge. We are indebted to them all.

Seventeen of us gathered in Selwyn College on 31 March 1992 and departed on the morning of 4 April. In between we worked through the food, form and function topics, hearing what each of us could contribute (based on manuscripts submitted in advance of the meeting), and then dividing into groups to start the synthesis that provides the basis for the final chapter. Throughout we were very well

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nourished by the College, and had a long lunch break to allow the participants to enjoy Cambridge and the good spring weather and to recharge their batteries for the intensive sessions. The evenings were relaxed and prolonged, contributing in some intangible way to the production of the book.

The impressive effort has been sustained since, with the 19 core chapters being revised and refereed and the five introductory or concluding chapters produced in 9 months – a very real team effort involving 23 contributors in all. Thus, the seed planted in 1988 germinated during the following 3 years to flower in 1992 and to fruit once Cambridge University Press complete their task, in 1994. Hopefully these fruits will be widely dispersed and digested chemically – by the brain rather than by the guts.

Finally, we reiterate our thanks to the contributors for their dedicated efforts throughout, to Dalgety plc and to Dr Alan Crowden and Cambridge University Press for agreeing to publish this volume and for advancing the fee to make the venture possible.

January 1993

D. J. Chivers

P. Langer