MACHINA CARNIS

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THE BIOCHEMISTRY OF MUSCULAR CONTRACTION IN ITS HISTORICAL DEVELOPMENT

by

DOROTHY M. NEEDHAM
F.R.S.
Fellow Emeritus of Lucy Cavendish College, Cambridge

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Fig. 85 is reproduced by courtesy of H. Fernández-Morán, The University of Chicago

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MEMORIAE
FREDERICI GOWLAND HOPKINS
PRAECEPTORIS OLIM ET AMICI
CONIVGI QVOQVE
IOSEPHO NEEDHAM
FAVTORI MONITORI ADIVTORI
PER ANNOS COMPLVRES
CONSTANTISSIMO
QVO SINE NIL PROFECISSET
HOC PIETATIS PIGNVS
D·M·N

Corporis membra in unam machinam ad usas vitales aptantur.

Asclepius, 27 (ca. 1st. cent. AD) in *Corpus Hermeticum*, II, p. 333

Iam vero quattuor elementorum diversitates contrariasque potentias nisi quaedam armonia coniungeret, qui fieri potest, ut in unum corpus ac machinam convenirent?

Boethius (d. AD 524), *De Institutione Musica*, I, 1

Partibus his constat humanae machina carnis,
sed multipliciter quae numerentur habes:
portio prima caput, collus ac brachia, truncus,
intera, sensus iners, femora, crura, pedes.

Eugenius of Toledo (d. AD 657), *Carmen* XLIII

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PREFACE

Looking back on the years spent in writing this book, I feel sometimes that it was done primarily for my own enjoyment. I wanted to visualise in a single perspective the path of man's knowledge about the function of muscles, progressing so slowly for so many centuries but then during the last seventy years reaching speedily towards the goal in a rush of great discoveries. Professor A. V. Hill, whose fundamental work constantly appears in these pages, tells me that he never took theories of contraction seriously; but perhaps he would not disagree with Dr William Croone who in the seventeenth century reckoned 'such speculations amongst the best entertainments of our mind'. Be this as it may, I hope that, in spite of its defects and omissions, this book will be useful to some of those for whom the fearful and wonderful phenomena of muscular movement retain all their fascination. We can respond to the words of Sir Thomas Browne (*Religio Medici* I. 13):

> Search while thou wilt, and let thy Reason go,
> To ransome Truth, even to th'Abyss below;
> Rally the scattered Causes; and that line
> Which Nature twists, be able to untwine...

DOROTHY M. NEEDHAM

The Master's Lodge
Gonville and Caius College
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Finally, I should like to place on record the inspiration that I derived from working in the Cambridge Biochemical Laboratory from 1919 to 1963.

D.M.N.

ABBREVIATIONS

ADP	Adenosine-5-diphosphate
AMP	Adenosine-5-monophosphate
ATP	Adenosine-5-triphosphate
CTP	Cytidine-5-triphosphate
CoA	Co-enzyme A
Co-Q	Co-enzyme Q
DEAE-cellulose	Diethylaminoethyl-cellulose
DNA	Deoxyribonucleic acid
DSEM	Disulphide-exchanged myosin
EDTA	Ethylenediaminetetracetate
EGTA	Ethyleneglycol-bis-β-amino-ethylether-N,N'-tetracetate
ESF	EGTA sensitising factor
FAD	Flavin-adenine dinucleotide
FDNB	1-fluoro-2,4-dinitobenzene
FeNH	Non-haem iron
flpr	flavoprotein
FMN	Flavin mononucleotide
GTP	Guanosine-5-triphosphate
HMM	Heavy meromyosin
IAA	Iodoacetic acid
$IANH_2$	Iodoacetamide
IDP	Inosine-5-diphosphate
IMP	Inosine-5-monophosphate
ITP	Inosine-5-triphosphate
LMM	Light meromyosin
NAD	Nicotinamide-adenine dinucleotide (cozymase)
NADP	Nicotinamide-adenine dinucleotide phosphate
NEM	*N*-ethylmaleimide
NTP	*p*-nitrothiophenol
PCMB	*p*-chlormercuribenzoate
Q, Q_{275}, CoQ	Co-enzyme Q
RNA	Ribonucleic acid
RPS	Relaxing protein system
TNP	Trinitrophenol
TPP	Thiamine-pyrophosphate
UDP	Uridine-5-diphosphate
UDPG	Uridine diphosphate glucose
UTP	Uridine-5-triphosphate

NOTE. All units of temperature in the text are °C