

SYMPATHECTOMY

**AN ANATOMICAL AND
PHYSIOLOGICAL STUDY WITH
CLINICAL APPLICATIONS**

P. A. G. MONRO



OXFORD UNIVERSITY PRESS

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WITH CLINICAL APPLICATIONS

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LONDON
OXFORD UNIVERSITY PRESS

NEW YORK TORONTO

1959

Oxford University Press, Amen House, London E.C.4

GLASGOW NEW YORK TORONTO MELBOURNE WELLINGTON

BOMBAY CALCUTTA MADRAS KARACHI KUALA LUMPUR

CAPE TOWN IBADAN NAIROBI ACCRA

© *Oxford University Press 1959*

Printed in Great Britain

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enfermé dans une Gaine avec le Nerf de la 8^{me} Paire, & on ne peut couper l'un sans l'autre, mais il est bien sûr que ce Nerf de la 8^{me} Paire n'a aucun rapport aux Yeux, ainsi tout ce qui arrive aux Yeux par cette opération ne peut jamais être attribué qu'à l'Intercostal. Dans toutes les expériences de M. Petit les effets qu'on auroit cru devoir plus naturellement provenir de ce que l'Intercostal étoit coupé, la perte ou l'affoiblissement de la voix, les vomissements, les palpitations de cœur, &c. ont tous varié, & varié considérablement, & jusqu'au point de manquer quelquefois, mais ceux qui appartenoient aux Yeux ont été beaucoup plus constants, les Yeux sont devenus ternes, ils ont diminué, ils ont jeté de la Chassie ou des larmes, la Cornée s'est applatie, une membrane cartilagineuse qui coule sur le bord de la Cornée s'est étendue, & en a couvert une partie, la Conjonctive s'est enflammée, &c. car nous supprimons un détail trop particulier. Et afin qu'il ne reste aucun doute sur ces accidents des Yeux, ils ne sont jamais arrivés qu'à l'Oeil droit ou au gauche, quand l'Intercostal n'a été coupé que de l'un ou de l'autre côté.

Il est donc Lien démontré que l'Intercostal porte des Esprits dans les Yeux, mais comme ce n'est qu'en certaines parties des Yeux, le désordre que cause la section de ce Nerf arrive parce que quelques parties sont privées des Esprits qu'elles eussent dû recevoir, tandis que d'autres ne le sont pas. Toutes les parties du Corps animal sont en quelque sorte arc-boutées les unes contre les autres, & se tiennent en état par cet équilibre. Celles à qui il manque des Esprits qui leur appartenoient, perdent la tension nécessaire, se relâchent, & d'autres profitent aussi-tôt de leur foiblesse, & usurpent sur elles. Les liqueurs qui ne coulent plus assés facilement dans des vaisseaux relâchés, s'y amassent, & si la liqueur est du sang, voilà une inflammation; si c'est celle qui doit comme dans les Yeux entrer par les *Points lacrimaux*, & qui ne le peut plus, du moins en assés grande quantité, ce sont des larmes, ou de la Chassie, qui coulent au dehors. Il se peut

Hist. 1727.

B

FIG. 1. Facsimile from *Histoire de l'Académie Royale des Sciences, Paris*, du Petit (1727).

[Frontispiece]

TO THE MEMORY OF
S. S.

*A patient and a veterinary student upon
whose body many observations were made. She had always
shown much interest in this research
although at that time it was only in its early stages. After
leaving hospital after the operations and before
she had to return, as she realized, to die, she particularly
requested her relatives to grant permission
for a post-mortem examination if for research purposes
this should be asked for*

FOREWORD

PLANNED and deliberate operations for removal of parts of the sympathetic nervous system have been carried out for some eighty years. Many of the earlier surgical interventions were based on faulty ideas concerning the function and structure of the autonomic nervous system. In the last thirty years, however, our knowledge of this system has become much clarified. As a result the indications for sympathectomy have become much more rational, and tests, based on sound physiology, are currently available to assess the probability of a successful outcome of a surgical intervention in a particular patient. The action of drugs on the autonomic nervous system is also now much better understood, and important advances have been made in our knowledge of its detailed anatomy.

Nevertheless, and notwithstanding such clarification, there are still many problems posed by the system. Thus it is surprising that so little has been established concerning the more remote effects of sympathectomy. There is also much confusion in the literature on post-operative regeneration of autonomic fibres. Indeed some of the alleged rapid regenerations could only be described as miraculous if it were not apparent that they can, more rationally and quite satisfactorily, be explained by faulty operative technique or by the failure to recognize the existence of alternative pathways. Furthermore the follow-up of patients subjected to sympathectomy has often been casual; both in the living and after death interest has been directed almost exclusively to the clinical and pathological conditions rendering the sympathectomy necessary. Almost no attention has been given to the long range effects of such operations on the function and structure of the sympathetic nervous system itself. It is remarkable that effectively no autopsy reports are available on sympathectomized patients which enable a precise statement to be made on exactly what parts, and how much, of the sympathetic chain was removed or on what effect there had been on the structure of the remaining portions of the chain.

In this volume Dr Monro has brought together careful observations on a large series of patients who had been subjected to various types of sympathectomy. These patients were studied over extensive periods of time and the ultimate effects of the operations on the functional activity of the intact parts of the sympathetic nervous system have been most carefully assessed. The work reported covers a period of some ten years. Incorporated in the volume is material from Dr Monro's M.D.

thesis which was accepted by the University of Cambridge in 1954. This thesis was awarded the Raymond Horton-Smith Prize, as the best M.D. dissertation submitted that year. He has now brought the data on his patients up to date and provides what, in my opinion, is the best available account of the long range effects of sympathectomies on the autonomic nervous system of Man. Dr Monroe's findings will, I believe, be of considerable interest to surgeons, clinicians, physiologists, pharmacologists and anatomists. I warmly recommend his volume to the attention of all who are concerned with problems involving the human autonomic nervous system.

J. D. BOYD

CAMBRIDGE

December 1958

PREFACE

THIS monograph is a report of ten years' work on problems affecting the sympathetic nervous system and the operations of sympathectomy. It has entailed continued observations on more than fifty individual patients for periods up to four years, and most of these patients continue to attend for re-examination. A few patients have died and this report includes detailed findings of a post-mortem examination on one patient who had previously been tested after paravertebral sympathectomy. This section provides detailed anatomical information on the lumbar intermediate sympathetic ganglia. The importance of these ganglia and the part they play in the retention of autonomic function after sympathectomy was first made clear in a paper published jointly with Professor J. D. Boyd in 1949.

The two principal methods of investigation of the clinical cases have been to record the patterns of sweating activity in order to detect the presence or absence of intact sudomotor pathways, and to measure blood flows in the fingers and toes in order to detect the presence or absence of vasomotor innervation. These methods are among the most sensitive for detecting sympathetic activity in man. No other report has considered the combination of these two techniques as a method of assessing sympathetic activity, nor has any report been made of the changes of either of these forms of activity which occur at varying, and at repeated, intervals after sympathectomy.

The monograph is divided into three parts, each part containing an historical introduction. The first part contains a detailed account of observations and changes in the sweating pattern and vasomotor innervation carried out on clinical cases at varying intervals since operation—but no attempt has been made to discuss the clinical results, other than those made objectively on the various types of autonomic activity.

The second part contains a detailed account of the findings made post mortem and examined histologically. These findings are discussed in relation to the explanation of autonomic activity retained after sympathectomy in one area of the body. This part also deals with the probable explanations for autonomic activity retained in other areas after the appropriate sympathectomy.

The third part contains a more detailed account of observations on the changes in vasomotor innervation after sympathectomy. It is concluded with a discussion on the recovery of function after sympathectomy and with the author's suggested explanation.

As an assistance in reading, general conclusions are made at the end of each section, and a chapter on clinical applications has been added which summarizes the anatomical and surgical implications of the various types of sympathectomy in man.

An appendix contains details of apparatus which has been used in this research.

P. A. G. M.

CAMBRIDGE

October 1958

ILLUSTRATIONS

1. Facsimile, from du Petit (1727)	<i>Frontispiece</i>
2. Dermatome Chart, constructed from Foerster (1933)	<i>page</i> 28
3. Dermatome Chart, according to Head (1900)	29
4. Cases E.R., A.T., B.S., D.McM., S.S., W.P.	32
5. Case Mn.B.	35
6. Cases E.P., K.F.	37
7. Case W.S.	39
8. Case L.C.	41
9. Case J.T.	43
10. Cases Mt.B., W.D., E.T.	46
11. Cases P.F., E.I.	48
12. Pilo-erector Response to Stroking—Case P.F.	<i>facing page</i> 50
13. Cases E.F., E.H.	<i>page</i> 51
14. Case V.F.—Retro-pleural. Cases M.R., T.B., D.Cl., D.F.—Transthoracic	53
15. Cases A.P., F.T.	58
16. Cases W.R., W.T., R.R., J.D., R.Ha.	61
17. Case D.Cr.	63
18. Case B.E.	65
19. Cases C.D., A.D., A.A., G.H.	69
20. Cases F.McC., D.M., J.C.	71
21. Cases R.D., M.M., H.F.	74
22. Operative Technique of Preganglionic Sympathectomy, from Smithwick (1940)	75
23. Cases M.Pt., J.Tn., A.C., R.H.—Anterior Rhizotomy	79
24. Cases M.K., M.Pn., M.T.	81
25. Case C.A.	83
26. First Thoracic Anterior Root, $\times 100$	<i>facing page</i> 84
27. Degenerated Second Thoracic Anterior Root, $\times 100$	84
28. Case E.C.—Brachial Plexus Avulsion	<i>page</i> 89
29. Case S.W.—Paravertebral Phenol Injection	104
30. T.S. 100 mm. <i>c.r.</i> Human Foetus, from Boyd (1957)	106
31. Lateral 100 mm. <i>c.r.</i> Human Foetus, from Boyd	106
32. Diagram of Thoraco-lumbar Sympathectomy, from Boyd and Monro (1949)	107

33. Possible Sympathetic Pathways, from Boyd (1957)	.	.	109
34. Case S.S.—Sweating Pattern	.	.	118
35. 1st Lumbar Nerve Root. No. 8 Ganglion, $\times 180$		<i>facing page</i>	120
36. Paravertebral Sympathetic Ganglion Cell, $\times 500$	.	.	120
37. Intermediate Sympathetic Ganglion Cell, $\times 500$	.	.	121
38. Posterior Root Ganglion Cell, $\times 500$	.	.	121
39. Graph of Cells in Intermediate Ganglia. 1st Lumbar Nerve Root	.	<i>page</i>	122
40. Reconstruction Drawing of 1st Lumbar Nerve Root (<i>Right side</i>)	.		123
41. Reconstruction Drawing of 2nd Lumbar Nerve Root (<i>Right side</i>)			124
42. Diagram of Intermediate Ganglia in relation to 2nd and 3rd Lumbar Nerve Roots (<i>Left side</i>)	.	.	125
43. 2nd Lumbar Nerve Root, $\times 2.7$	.	.	<i>between pages 132 and 133</i>
44. 2nd Lumbar Nerve Root. No. 7 Ganglion, $\times 82$.	.	
45. Lumbar Nerve Roots showing Sites of Ganglia (<i>Right side</i>)	.	.	
46. 2nd Lumbar Nerve Root (<i>Left side</i>), $\times 12$.	.	
47. Ramus Communicans accompanying Artery, $\times 30$.	.	
48. Multipolar Intermediate Ganglion Cells, $\times 640$.	.	
49. Lumbar Nerve Roots showing Sites of Ganglia (<i>Left side</i>)	<i>facing page</i>		140
50. T.S. 60 mm. <i>c.r.</i> Human Foetus, $\times 16$	.	.	141
51. Intermediate Ganglia in Lumbar Region, from Wrethe (1943)	<i>page</i>		142
52. Intermediate Ganglia in Human Foetus, from Wrethe (1943)	.		143
53. Occurrence of Intermediate Ganglia in Human Embryos, from Wrethe (1941)	.	.	144
54. 3rd and 4th Sacral Dermatomes (Hyperaesthesia), according to Head (1893)	.	.	149
55. 3rd and 4th Sacral Dermatomes (Herpes Zoster), according to Head (1893)	.	.	149
56. Male Macaque. 9th Post-costal Dermatome, from Sherrington (1893)	.	.	150
57. Male Macaque. 9th Post-costal Dermatome (Scrotum), from Sherrington (1893)	.	.	150
58. Female Macaque. 9th Post-costal Dermatome, from Sherrington (1893)	.	.	151
59. Course of Sweating Fibres to the Face, from List and Peet (1938)			160
60. Course of Sweating Fibres and Accessory Autonomic Fibres to the Face, from Guttmann and List (1928)	.	.	161
61. Development of Dermatomes in Neck Region, from Frazer (1927)	.	.	164
62. Case H.F. Gustatory Sweating	.	<i>facing page</i>	174
63. Case B.B. Left Facial Hyperhidrosis	.	<i>page</i>	176

64. Blood Flows in Normal Fingers. Case F.McC.	} between pages 196 and 197	
65. Blood Flows in Toes after Thoraco-lumbar Sympathectomy. Cases V.F., E.F.		
66. Blood Flows after Brachial Plexus Lesion. Case E.C.		
67. Skin Temperatures, Blood Flows and Pulse Waves in Normal Fingers. Case F.McC.		page 200
68. Blood Flows and Pulse Waves after Sympathectomy. Case F.McC.		201
69. Blood Flow Heating Index		206
70. Pulse Wave Heating Index		207
71. Correlation of Flow and Pulse Indices		209
72. Direct Correlation of Digital Blood Flow and Pulse Wave		210
73. Cervical Intermediate Sympathetic Ganglia, from Skoog (1947)		222
74. Connections of Preganglionic Fibres in Cervical Region	facing page	227
75. Vasomotor and Sudomotor Activity in Hands, from Barcroft and Hamilton (1948)		page 233
76. Sweating Test Cabinet	} between pages 250 and 251	
77. Sweating Test Cabinet arranged for Plethysmography of Fingers or Toes		
78. Toe in Plethysmograph Cup		
79. Digital Plethysmograph. Toe and Finger Cups are shown		
80. Specimen Plethysmographic Record		
81. Transparent Scale for reading Plethysmograph records	page	252
82. Plan and Elevation of Digital Plethysmograph		254
83. Plan and Diagram of Automatic Recording Skin Thermometer		257
84. Circuit Diagram of Skin Resistance Meter		258

TABLES

I.	Thoraco-lumbar Sympathectomy	<i>page</i>	94
II.	Lumbar Sympathectomy		96
III.	Cervico-dorsal Sympathectomy		97
IV(a).	1st Lumbar Nerve Root (<i>Right side</i>)		126
(b).	2nd Lumbar Nerve Root (<i>Right side</i>)		127
(c).	3rd, 4th and 5th Lumbar and 9th and 12th Thoracic Nerve Roots (<i>Right side</i>)		130
V(a).	11th and 12th Thoracic and 1st and 2nd Lumbar Nerve Roots (<i>Left side</i>)		138
(b).	2nd, 3rd, 4th and 5th Lumbar Nerve Roots (<i>Left side</i>)		139
VI.	Calibre Spectra of Ventral Spinal Nerve Roots in Adult Man, from Rexed (1944)		152
VII.	Calibre Spectra of Cranial Nerves in the New-born, from Rexed (1944)		154
VIII.	Calibre Spectra of Ventral Spinal Nerve Roots in the New- born, from Rexed (1944)		155
IX.	Blood Flow and Pulse Wave Observations	<i>facing page</i>	204
X.	Analysis of Vasomotor Recovery	<i>page</i>	208

ACKNOWLEDGEMENTS

I AM very grateful to Mr D. W. C. Northfield, Surgeon-in-charge of the Neurosurgical Department, The London Hospital, for permission to examine patients under his care and for his continued interest and support during the progress of these investigations.

I am also very grateful to Professor J. D. Boyd, Professor of Anatomy in the University of Cambridge and lately University Professor of Anatomy at The London Hospital Medical College, for granting me the facilities of his Departments, for his constant advice and encouragement, and for assistance especially with the embryology, and for certain illustrations.

I also wish to thank Professor H. Barcroft, Sherrington Professor of Physiology at St Thomas's Hospital Medical School, for interest and advice in regard to observations on blood flow.

Others who have kindly provided assistance have been Mr J. V. Crawford and Mr W. J. Atkinson of the Neurosurgical Department of The London Hospital; Mr D. R. Cox, lately of the Statistical Laboratory of The University of Cambridge—for advice on statistics; Miss P. Archer, lately of The London Hospital Medical College—for assistance with drawings Nos. 40, 41 and 42; Mr R. Birchenough of the Anatomy Department of The London Hospital Medical College—for technical assistance with section cutting; Mr R. Quinton Cox of the same Department and Mr John King of the Bernhard Baron Institute of Pathology, The London Hospital—for the majority of the photomicrographs; and Mr T. R. L. Brooks and Mr J. F. Crane of the Anatomy School of the University of Cambridge, for the other photography.

I wish to acknowledge the kindness of other authors and publishers for their permission to reproduce a number of illustrations which are essential to the understanding of the text and which otherwise might not readily be available. These are:

Acta Psychiatrica et Neurologica Scandinavica (Ejnar Munksgaard Forlag) and Professor B. Rexed for Tables vi, vii and viii; *Annals of Surgery* (J. B. Lippincott Co.) and Dr R. H. Smithwick for Fig. 22; *Archives of Neurology and Psychiatry* (American Medical Association), and Drs C. F. List and M. M. Peet for Fig. 59; *Brain* (Macmillan and Co. Ltd) for Figs. 2, 3, 54 and 55; *British Medical Bulletin* and Professor J. D. Boyd for Figs. 30 and 33; *Journal of Anatomy* (Cambridge University Press) for Fig. 61; *The Lancet* for Fig. 32 and also Dr T. Skoog for Fig. 73 and also Professor H. Barcroft and Dr G. T. C. Hamilton

for Fig. 75; *Philosophical Transactions Series B* (The Royal Society) for Figs. 56, 57 and 58; *Zeitschrift für mikroskopisch-anatomische Forschung* (Geest and Portig K.-G) and Professor M. Wreite for Figs. 51, 52 and 53; *Zentralblatt für die gesamte Neurologie und Psychiatrie* (Springer-Verlag) and Drs L. Guttmann and C. F. List for Fig. 60.

I also wish to acknowledge the receipt of grants for expenses from the Research Funds of The London Hospital, to the Governors of which I express my grateful appreciation, and to The Royal Society for grants for the study of the microcirculation in animals, for which also I am grateful.

Finally, I thank Miss D. L. Hayward for much secretarial assistance and the publishers for their courtesy and my wife for her help and patience.

Numbers in the text printed in italic refer to a page or figure in another publication.

CONTENTS

PART ONE

SWEATING PATTERNS AFTER SYMPATHECTOMY

	<i>Page</i>
1. §1. Historical Introduction	3
§2. The Detection of Sweating Activity	9
§3. The Electrical Skin Resistance Method for Detection of Sweating	11
2. Technique and Extent of the Operations on the Sympathetic Nervous System	13
3. §1. Observations on Patients	17
§2. Method of Testing	19
§3. Carbachol Sweating Test	22
4. Dermatome Patterns and Analysis of Individual Sweating Areas	26
5. §1. Sweating Patterns after Thoraco-lumbar Sympathectomy	31
General Conclusions	56
§2. Sweating Patterns after Lumbar Sympathectomy	57
General Conclusions	60
§3. Sweating Patterns after Four-quarter Sympathectomy	62
General Conclusions	70
§4. Sweating Patterns after Cervico-dorsal (Cervico-thoracic) Sympathectomy	70
General Conclusions	76
§5. Observations after Other Forms of Nerve Section	77
Anterior Rhizotomy	78
General Conclusions	80
Peripheral Nerve Section	82
First Thoracic Anterior Rhizotomy—with Sympathectomy	87
General Conclusions	87
Segmental Peripheral Nerve Lesions—Brachial Plexus Lesion	90
General Conclusions	92
6. Conclusions from Sweating Patterns	92
Summary	99