BRITISH MEDICAL BULLETIN

VOLUME THIRTY-ONE
1975

PERINATAL RESEARCH

Scientific Editor  P. W. NATHANIELSZ

RESEARCH IN DENTISTRY

Scientific Editor  B. COHEN

CHEMICALS IN FOOD AND ENVIRONMENT

Scientific Editor  M. WEBB

Managing Editor  O. M. Harrison

MEDICAL DEPARTMENT • THE BRITISH COUNCIL • 65 DAVIES STREET • LONDON • W1Y 2AA
**CONTENTS OF VOLUME THIRTY-ONE**

**NUMBER 1. Perinatal Research**

*Scientific Editor: P. W. NATHANIELSZ*

<table>
<thead>
<tr>
<th>Topic</th>
<th>Author(s)</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduction</td>
<td>K. W. Cross</td>
<td>1</td>
</tr>
<tr>
<td>Fetal breathing</td>
<td>K. Boddy &amp; G. S. Dawes</td>
<td>3</td>
</tr>
<tr>
<td>Analysis of the rhythm of infantile breathing</td>
<td>M. K. S. Hathorn</td>
<td>8</td>
</tr>
<tr>
<td>Pharmacological approaches to the acceleration of fetal lung maturation</td>
<td>Mary Ellen Avery</td>
<td>13</td>
</tr>
<tr>
<td>Management of hyaline membrane disease</td>
<td>E. O. R. Reynolds</td>
<td>18</td>
</tr>
<tr>
<td>Placental transfer of blood gases</td>
<td>R. S. Comline &amp; Marian Silver</td>
<td>25</td>
</tr>
<tr>
<td>Storage and supply of fatty acids before and after birth</td>
<td>D. Hull</td>
<td>32</td>
</tr>
<tr>
<td>Control of carbohydrate metabolism in the fetus and newborn</td>
<td>Heather J. Shelley, J. M. Bassett &amp; R. D. G. Milner</td>
<td>37</td>
</tr>
<tr>
<td>The place of the renin–angiotensin system before and after birth</td>
<td>Joan C. Mott</td>
<td>44</td>
</tr>
<tr>
<td>Thyroid function in the fetus and newborn mammal</td>
<td>P. W. Nathanielsz</td>
<td>51</td>
</tr>
<tr>
<td>Prenatal endocrine function and the initiation of parturition</td>
<td>J. R. G. Challis &amp; G. D. Thorburn</td>
<td>57</td>
</tr>
<tr>
<td>Body temperature control in mammalian young</td>
<td>G. Alexander</td>
<td>62</td>
</tr>
<tr>
<td>Thermal neutrality</td>
<td>Edmund Hey</td>
<td>69</td>
</tr>
<tr>
<td>Pharmacology and the fetus</td>
<td>Garry R. Van Petten</td>
<td>75</td>
</tr>
<tr>
<td>Taste and swallowing in utero: a discussion of fetal sensory function</td>
<td>C. M. Mistretta &amp; R. M. Bradley</td>
<td>80</td>
</tr>
<tr>
<td>Low-birth-weight infants: neurological sequelae and later intelligence</td>
<td>Pamela A. Davies &amp; Ann L. Stewart</td>
<td>85</td>
</tr>
</tbody>
</table>

Notes on Contributors 92  
Book Reviews 95

**NUMBER 2. Research in Dentistry**

*Scientific Editor: B. COHEN*

<table>
<thead>
<tr>
<th>Topic</th>
<th>Author(s)</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduction</td>
<td>B. Cohen</td>
<td>99</td>
</tr>
<tr>
<td>Causal mechanisms of craniofacial deformity</td>
<td>David Poswillo</td>
<td>101</td>
</tr>
<tr>
<td>Genetic variation and tooth development</td>
<td>J. A. Sofaer</td>
<td>107</td>
</tr>
<tr>
<td>Pain from dentine and pulp</td>
<td>D. J. Anderson</td>
<td>111</td>
</tr>
<tr>
<td>Composition of dental enamel</td>
<td>J. A. Weatherell</td>
<td>115</td>
</tr>
<tr>
<td>Scanning electron microscopy of enamel surfaces</td>
<td>A. Boyde</td>
<td>120</td>
</tr>
<tr>
<td>Immunological aspects of dental caries and periodontal disease</td>
<td>Thomas Lehner</td>
<td>125</td>
</tr>
<tr>
<td>Bacterial flora of dental plaque</td>
<td>J. M. Hardie &amp; G. H. Bowden</td>
<td>131</td>
</tr>
<tr>
<td>Effect of diet on dental caries</td>
<td>R. L. Hartles &amp; S. A. Leach</td>
<td>137</td>
</tr>
<tr>
<td>Recent advances in work on fluorides and the teeth</td>
<td>G. N. Jenkins</td>
<td>142</td>
</tr>
<tr>
<td>Epidemiology of dental caries: the British scene</td>
<td>P. M. C. James</td>
<td>146</td>
</tr>
<tr>
<td>Research in dental care</td>
<td>H. Allred &amp; M. H. Hobdell</td>
<td>149</td>
</tr>
<tr>
<td>Recent advances in physiology of salivary glands</td>
<td>J. R. Garrett</td>
<td>152</td>
</tr>
<tr>
<td>Salivary gland disease</td>
<td>Derrick M. Chisholm &amp; David K. Mason</td>
<td>156</td>
</tr>
<tr>
<td>The pathogenesis of dental cysts</td>
<td>Malcolm Harris &amp; Paul Toller</td>
<td>159</td>
</tr>
<tr>
<td>Premalignant lesions in the mouth</td>
<td>R. A. Cawson</td>
<td>164</td>
</tr>
<tr>
<td>Permeability of oral mucosa</td>
<td>C. A. Squier &amp; N. W. Johnson</td>
<td>169</td>
</tr>
</tbody>
</table>

Notes on Contributors 176  
Book Reviews 179
INDEX TO VOLUME THIRTY-ONE

Names printed in capitals are those of authors who have contributed papers. Titles of books are printed in italics.

A

Accidents, fatal, non-occupational, 187
Adrenal cortex, fetal, 57
— gland, fetal differentiation, 59
β-Adrenoceptor responses in fetus, 76, 77
Aflatoxin and cancer, 232
Agricultural Research Council & Medical Research Council: Food and nutrition research: Report of the ARC/MRC Committee, 266
Air pollution by carbon monoxide, 256
Alcohol and cancer, 232
ALEXANDER, G.: Body temperature control in mammalian young, 62
Alkylmercury compounds, 242
ALLRED, H. & HOBDELL, M. H.: Research in dental care, 149
ANDERSON, D. J.: Pain from dentine and pulp, 111
Angiotensin, 44, 45
Angiotensin II, production in fetal lambs, 47
Apley, J. (editor): Modern trends in pediatrics, 4, 96
Asbestos and cancer, 232
AUSTWICK, P. K. C.: Mycotoxins, 222
AVERY, M. E.: Pharmacological approaches to the acceleration of fetal lung maturation, 13

B

Ballantyne, B. (editor): Forensic toxicology, 267
BARNES, J. M.: Assessing hazards from prolonged and repeated exposure to low doses of toxic substances, 196
BASSETT, J. M., see SHELLY, H. J., 37
Bate, J. G., see Wakeley, C., 268
Behavioural disorders in children of low birth weight, 87
Benzoin acid as food preservative, 216
Bibliography: Use of medical literature, 98

Biographical notes on contributors, 92, 176, 261
Birth size, relation to thermal control, 67
— weight, low, neurological sequelae and later intelligence, 85
Blood gas tensions in fetal and maternal blood, 26
— gases, placental transfer, 25
— pH changes during labour, 29
— pressure changes, intra-uterine, 29
BODDY, K. & DAWES, G. S.: Fetal breathing, 3
Body temperature and thermal neutrality, 69
— control in mammalian young, 62
— relation to body size, 67
Bone-resorbing factor in cyst tissue, 161
BOWDEN, G. H., see HODGSON, R. G., 131
BOYDE, A.: Scanning electron microscopy of enamel surfaces, 120
BRADLEY, R. M., see MISTRETTA, C. M., 80
Breathing in newborn, 6, 8
— movements, fetal, 3
Bretherton, L.: Handbook of reactive chemical hazards: an indexed guide to published data, 267
Burt, B. A., see Slack, G. L., 179

C

Cadmium, environmental sources, 246
— hazards to man and environment, 249
— in living organisms, 246
— man, 247
— ions, interaction with essential metallic ions, 248
Cameron, J. M. & Sims, B. G.: Forensic dentistry, 180
Cancer, environmental causes, 232
Carbohydrate metabolism in fetus and newborn, 37
Carbon dioxide tension, changes during labour, 29
— monoxide, absorption, 257
— ambient air quality criteria, 260
— effects, 258
— excretion, 257
— pollution, 256
— sources, 256
Carcinogens, chemical, 199, 232
— natural, in food, 209
Cardiovascular disease, relation to water hardness, 231
Caries, dental, adult studies, 147
— and chemical composition of enamel, 118
— carbohydrate and, 138
— effect of diet on, 137
— epidemiology, 146
— factors responsible, 138
— immunological aspects, 125
— incidence, effects of social class, 147
— initiation, 137
— relation to refinement of foods, 139
— sugar intake, 140
CAWSON, R. A.: Premalignant lesions in the mouth, 164
Cerebral palsy in low-birth-weight infants, 86
CHALLIS, J. R. G. & THORBURN, G. D.: Prenatal endocrine function and the initiation of parturition, 57
CHARLESWORTH, F. A., see CRAMPTON, R. F., 209
Chemical hazards: Handbook of reactive chemical hazards: an indexed guide to published data, 267
— in the home, 191
Chemicals in food and environment, 181–268
Children's dental health in England and Wales 1973, 179
CHISHOLM, D. M. & MASON, D. K.: Salivary gland disease, 156

Notes on Contributors 261
Book Reviews 263
INDEX TO VOLUME THIRTY-ONE

Insecticides, nature of toxic effects, 198
Intelligence in children of low birth weight, 87
Isoxsuprine in prevention of respiratory distress syndrome, 15
J
JAMES, P. M. C.: Epidemiology of dental caries: the British scene, 146
JENKINS, G. N.: Recent advances in work on toxics with a review of general principles and of specifications: 17th Report, 265
JOHNTHON, N. W., see SQUIER, C. A., 169
Joint FAO/WHO Expert Committee on Food Additives: Evaluation of certain food additives: 16th Report, 265
— Textological evaluation of certain food additives with a review of general principles and of specifications: 17th Report, 265
— Textological evaluation of some food colours, enzymes, flavour enhancers, thickening agents, and certain other food additives, 265
— Toxicological hazards of some food additives including anticoagulating agents, antimicrobials, antioxidants, emulifiers and thickening agents, 265
J
Keratocyst, dental, 160
Knight, J., see Elliott, K., 95
K
Lang, M., see Clarke, E. G. C., 263
LAWOTHER, P. J.: Carbon monoxide, 256
LEACH, S. A., see HARTLES, R. L., 137
Ledingham, J. G. G. (editor): Tenth symposium on medical research: a statistical and epidemiological approach, 268
Lipid metabolism, fetal, role of placenta, 34
Lipolysis in fetus and newborn, 35
LLOYD, A. G. & DRAKE, J. J. P.: Problems posed by essential food preservatives, 214
Lung, continuous inflating pressure in treatment of hyaline membrane disease, 20
— maturation in fetus, acceleration, pharmacological approaches, 13
— ventilation, mechanical, in management of hyaline membrane disease, 21
M
MAGOS, L.: Mercury and mercurials, 241
Mandibulofacial dysostosis, 105
Marriott, K. G., see Clarke, E. G. C., 263
MARTIN, J. E.: Water supplies of the future and the recycling of drinking water, 251
MASON, D. K., see CHISHOLM, D. M., 156
Meat, pesticide residues in, 202
Preserved, use of additives, 206, 217
Medical research: a statistical and epidemiological approach, 268
Medical Research Council, see Agricultural Research Council, 266
Medicine, literature: Use of medical literature, 236
— Tenth symposium on advanced medicine, 97
Medicines, household, hazards of, 194
Mercury, biotransformation and concentration in ecosytems, 264
— environmental, 241
— in food, 205
— salts, inorganic, 242
— Use of mercury and alternative compounds as seed dressings: Report of a Joint FAO/WHO Meeting, 264
— vapour, 241
Metabolism: Treatment of inborn errors of metabolism: current treatment and future prospects, 97
Metabolism-temperature curves, 62
Microbial protein, 221
Mikulicz’s disease, 158
MILNER, R. D. G., see SHELLEY, H. J., 37
MISTRETTA, C. M. & BRADLEY, R. M.: Taste and swallowing in utero: a discussion of fetal sensory development, 80
Morgan, D. M., see Keay, A. J., 96
MORLEY, D.: Paediatric priorities in the developing world, 264
MOTT, J. C.: The place of the renal-angiotensin system before and after birth, 44
Mouth, cancer, epidemiology, 164
— transfer of blood gases by, 25
— vascular architecture, 25
Mucosa, oral, permeability, 169
Mycothomas, 222, 224
Mycothoxyins, 222, 223
— containing food, 206, 222
— Myo-epithelial cells, salivary, 153
N
NATHANIELSZ, P. W.: Thyroid function in the fetus and newborn mammal, 51
NEUBERGER, A.: Chemicals in food and animal feeds: Report of a WHO Expert Committee, 266
— Handbook on human nutritional requirements, 266
Neuropephelous sequelae in low-birth-weight infants, 181
Newborn, see Infant, newborn.
Newborn, see Infant, newborn.
Nicol, B. M., see Passmore, R., 266
Nitrates as food preservatives, 217
Nitrates as food preservatives, 217
Nitrates, as food preservatives, 217
Nitrites as food preservatives, 217
Nodulins contained in food, 206
Nutrition: Food and nutrition research: Report of the ARC/MRC Committee, 266
— Handbook on human nutritional requirements, 266
Occupations, disabilities caused by, 185
— mortality, characteristics of, 20
— occupational, environmental, etc., 184
Odontogenic cysts, 159
Oestrogens, feto-placental, 59
Organochlorine compounds, toxicity, 198
— pesticides as food contaminants, 202
Organomercurials with rapid metabolism to inorganic mercury, 242
Oxalates as food toxins, 211
— Oesophageal cysts, 159
Oxygen consumption of fetus and placenta, 28
— supply to fetus, 27
— tension, changes during labour, 29
— therapy in hyaline membrane disease, 19
P
Paediatrics: Modern trends in paediatrics: 4, 96
— Paediatric priorities in the developing world, 96
— Scientific foundations of paediatrics, 95
Paalm, cleft, causal mechanisms, 103
Parotid glands, nerve pathways, 154
Parturition, fetal role in initiation, 57
— premature, in sheep and goat, 60
Passmore, R., Nicol, B. M. & Rao, M. N.: Handbook on human nutritional requirements, 266
Perinatal research, 1–98
Perinatal cyst, 159
Pharmacology and the fetus, 75
Phytoalexins, toxic, 227
Pituitary-adrenal system in primate fetus, 58
Pituitary control of thyroid axis, 55
Placenta, gas transfer mechanisms, efficiency, 28
— oxygen consumption, 28
— transfer of blood gases by, 25
— vascular architecture, 25
Plaque, dental, bacterial flora of, 131
Pesticides in the home, hazards of, 193
— Pesticides: nomenclature, specification, analysis, use, and residues in foods, 264
— residues in food, 202
Pigmentary and of specifications: 17th Report, 265
Pollution, environmental: Health aspects of environmental pollution control: planning and implementation of national programmes: Report of a WHO Expert Committee, 263
— Monitoring of the environment in the United Kingdom, 267
POWILL, D.: Causal mechanisms of craniofacial deformity, 101
Preservatives, chemical, in food, 214
Propionic acid as food preservative, 216
Protien, new sources of, 221
R
Rajagopalan, S. & Shifman, M. A.: Guide to simple sanitary measures for the control of enteric diseases, 268
Rao, M. N., see Passmore, R., 266
Renin-angiotensin system, 44
— after birth, 48
— at parturition, 48
— in fetal life, 47
Research, medical: Medical research: a statistical and epidemiological approach, 268
Respiration, fetal, 3
— in newborn, 6
Respiratory distress syndrome, management, 18
— prevention, 15
REYNOLDS, E. O. R.: Management of hyaline membrane disease, 18
— Risks, acceptance of, 184
— evaluation of, 188
Salt, composition, chemical changes in disease, 157
— secretion, electrolytes in, 154
— reflex, role of sympathetic nerves, 154
— secretory IgA in, 125
INDEX TO VOLUME THIRTY-ONE

Salivary cells, permeability to non-electrolytes, 155
  — receptor mechanisms, 154
  — glands, blood-vessels, 153
  — diseases, 156
  — function tests, 156
  — lymphoepithelial lesions, 158
  — neoplasia, 157
  — neurohistology, 152
  — physiology, recent advances, 152
Sanitation: Guide to simple sanitary measures for the control of enteric diseases, 268
Saundert, R. A., see Seakins, J. W. T. '97
Shell-fish, cadmium in, 205
— lead in, 206
— mercury in, 205
— toxins in, 209
Shiftman, M. A., see Rajagopalan, S., 268
SILVER, M., see COMLINE, R. S., 25
Sims, B. G., see Cameron, J. M., 180
Single-cell protein, 221
Sjögren's syndrome, salivary glands in, 158
Slack, G. L. & Burt, B. A. (editors): Dental public health: an introduction to community dentistry, 179
SOFAER, J. A.: Genetic variation and tooth development, 107
Sorbiac acid as food preservative, 216
Soya bean, toxicological assessment, 221
SPICER, A.: Toxicological assessment of new foods, 230
SQUIER, C. A. & JOHNSON, N. W.: Permeability of oral mucosa, 169
Stephen, N. J., see Keay, A. J., 96
STEWART, A. L., see DAVIES, P. A., 85
Stiles, A. R., see Lowe, D. A., 254
Sucralose, epithelial permeability, 172
Sulphur dioxide as food preservative, 215
Surfactant, pulmonary, 13, 18
Swallowing in utero, 80, 81

T
  Taste in utero, 80
  Teeth, development, genetic variation, 107
  — matrix apposition and mineralization, 109
  — research in dental care, 149
  Thermal neutrality, 69
  Thermogenesis in newborn, 65
  Thermoregulatory mechanisms, control in newborn, 66
  THORBURN, G. D., see CHALLIS, J. R. G., 57
  Thyroid axis, hormonal changes, 53, 54
  — hypothalamic and pituitary control, 55
  — mammalian, 51
  — function in fetus and newborn mammal, 51
  — structural development, 51
  Thyroidectomy, fetal, effect, 52
  Thymotropin in fetus and newborn, 55
  Thyrotrophin-releasing hormone in fetus and newborn, 55
  Thyroxine, effect on fetal lung, 15
  — in perinatal period, 52
  Tobacco and cancer, 166, 232
  — smoke and carbon monoxide, 257
  Todd, J. E.: Children's dental health in England and Wales 1973, 179
  — & Whitworth, A.: Adult dental health in Scotland 1972, 179
  TOLLER, P., see HARRIS, M., 159
  Toothill, C., see Seakins, J. W. T., 97
  Toxic substances, exposure to low doses, hazards of, 196
  — nature of injury produced by, 197
  — sensitization to, 206
  — tissue concentration and speed of reaction, 197
  Toxicology: Forensic toxicology, 267
  — Modern trends in toxicology, 2, 263
  — Poisoning by drugs and chemicals, plants and animals: an index of toxic effects and their treatment, 264
  Toxins, natural, in food, 209
  Triglyceride, fetal, source of, 34
  Tri-iodothyronine, role in perinatal period, 54

V
  VAN PETTEN, G. R.: Pharmacology and the fetus, 75
  Visual defects in children of low birth weight, 87

W
  Wakeley, C. (editor): The Faber medical dictionary, 2nd ed., 268
  Water hardness and cardiovascular disease, 231
  — microbiological hazards, 254
  — mineral salt concentration in river waters, 252
  — pollution by organic substances, 253
  — recycling for drinking, 252
  — supplies, fluoridation, 142
  — future, 251, 254
  WEATHERILL, J. A.: Composition of dental enamel, 115
  WEBB, M.: Cadmium, 246
  Whitworth, A., see Todd, J. E., 179
  — Maturation of fetal body systems: Report of a WHO Scientific Group, 97
  — The use of mercury and alternative compounds as seed dressings: Report of a Joint FAO/WHO Meeting, 264

X
  Xerostomia, 156

Printed in Great Britain by William Clowes & Sons Limited, London, Colchester and Bectes
Research in Dentistry: Introduction

Research in dentistry cannot be separated from biological research as a whole. This is exemplified by the first two papers in this issue of *British Medical Bulletin*, which deal with prenatal factors affecting the human dentition: J. A. Sofaer has, in recent years, brought new knowledge of genetics to bear upon problems associated with the teeth, and the admirable researches of David Poswillo have illuminated dark corners of embryopathy in a variety of forms, even though they took origin in the study of cleft palate specifically.

In the last 20 years there has been a steady increase in the volume of dental research carried out in the UK, a development reflecting the concern aroused by the continuing toll of dental disease. This is a phenomenon particularly evident in urban communities but is by no means peculiar to developed countries nor even, as P. M. C. James has shown in his paper, to modern