

STUDIES IN THE SOCIAL HISTORY OF MEDICINE

In recent years, the social history of medicine has become recognized as a major field of historical enquiry. Aspects of health, disease, and medical care now attract the attention not only of social historians but also of researchers in a broad spectrum of historical and social science disciplines. The Society for the Social History of Medicine, founded in 1969, is an interdisciplinary body, based in Great Britain but international in membership. It exists to forward a wide-ranging view of the history of medicine, concerned equally with biological aspects of normal life, experience of and attitudes to illness, medical thought and treatment, and systems of medical care. Although frequently bearing on current issues, this interpretation of the subject makes primary reference to historical context and contemporary priorities. The intention is not to promote a sub-specialism but to conduct research according to the standards and intelligibility required of history in general. The Society publishes a journal, *Social History of Medicine*, and holds at least three conferences a year. Its series, Studies in the Social History of Medicine, does not represent publication of its proceedings, but comprises volumes on selected themes, often arising out of conferences but subsequently developed by the editors.

Margaret Pelling, Series Editor

Volumes in the series include

Life, Death and The Elderly

Edited by Margaret Pelling and Richard M. Smith

Medicine and Charity Before the Welfare State

Edited by Jonathan Barry and Colin Jones

IN THE NAME OF THE CHILD

Health and welfare, 1880-1940

Edited by Roger Cooter



London and New York

37
101
192
202

First published 1992
by Routledge

11 New Fetter Lane, London EC4P 4EE

Simultaneously published in the USA and Canada
by Routledge

a division of Routledge, Chapman and Hall, Inc.
29 West 35th Street, New York, NY 10001

© 1992 Roger Cooter the book as a whole;
the individual contributors their chapters

Typeset in Linotype Stempel Garamond by
Falcon Typographic Art Ltd., Edinburgh & London
Printed in Great Britain by
Biddles Ltd., Guildford, Surrey

All rights reserved. No part of this book may be reprinted or
reproduced or utilized in any form or by any electronic,
mechanical, or other means, now known or hereafter
invented, including photocopying and recording, or in any
information storage or retrieval system, without permission in
writing from the publishers.

British Library Cataloguing in Publication Data

In the name of the child: health and welfare,
1880-1940. - (Studies in the social history of medicine)
I. Cooter, Roger II. Series
362.7950942

Library of Congress Cataloging in Publication Data

In the name of the child: health and welfare,
1880-1940/edited by Roger Cooter.

p. cm. - (Studies in the social history of medicine)

Originated in a conference held at the Institute of Historical Research
in Oct. 1987, sponsored by the Society for the Social History of
Medicine and the British Paediatric Association.

Includes bibliographical references and index.

1. Children-Health and hygiene-History. 2. Child welfare-History.
I. Cooter, Roger. II. Society for the Social History of Medicine.
III. British Paediatric Association. IV. Series.

RJ101.I5 1992

362.1'9892'009-dc20 91-20287 CIP

ISBN 0-415-05743-4

37
101
192
202

CONTENTS

<i>List of illustrations</i>	vii
<i>Notes on contributors</i>	ix
<i>Preface and acknowledgements</i>	xii
INTRODUCTION	1
<i>Roger Cooter</i>	
1 BODIES, FIGURES AND PHYSIOLOGY: MARGARET MCMILLAN AND THE LATE NINETEENTH-CENTURY REMAKING OF WORKING-CLASS CHILDHOOD	19
<i>Carolyn Steedman</i>	
2 CHILD LABOUR, MEDICAL CAPITAL, AND THE SCHOOL MEDICAL SERVICE, c. 1890-1918	45
<i>Harry Hendrick</i>	
3 'WONDERLANDS OF BUTTERCUP, CLOVER AND DAISIES': TUBERCULOSIS AND THE OPEN-AIR SCHOOL MOVEMENT IN BRITAIN, 1907-39	72
<i>Linda Bryder</i>	
4 ORPHANS AS GUINEA PIGS: AMERICAN CHILDREN AND MEDICAL EXPERIMENTERS, 1890-1930	96
<i>Susan E. Lederer</i>	
5 FROM ISOLATION TO THERAPY: CHILDREN'S HOSPITALS AND DIPHThERIA IN <i>FIN DE SIÈCLE</i> PARIS, LONDON AND BERLIN	124
<i>Paul Weindling</i>	

ORPHANS AS GUINEA PIGS

American children and
medical experimenters, 1890–1930

Susan E. Lederer

In the decades between 1870 and 1930 the social and economic value of children in American society underwent a profound transformation.¹ The sentimentalization of children and the greater sensitivity to child mortality contributed to campaigns to promote child welfare, to the creation of a number of specialized institutions to enhance the physical and emotional well-being of American children, and to the development of a new medical specialty, paediatrics. The commitment to child health also spurred physicians to undertake researches that involved the use of both sick and healthy children, many of whom were inmates of orphanages or public hospitals, as experimental subjects. This chapter examines the use of children in medical research in the late nineteenth and early twentieth centuries. Although institutionalized children were more likely than their more prosperous counterparts to be reported as subjects of medical experiments, I will argue that physicians' decisions to experiment on these populations reflected the intersection of competing professional obligations and personal commitments, rather than the uncomplicated exploitation of accessible children.

One revealing source of information on professional attitudes toward experimentation with children is the controversy in the first two decades of the twentieth century over non-therapeutic human experimentation or 'human vivisection'.² In response to criticism from American anti-vivisectionists and vivisection reformers, for whom the 'vivisection of children' was the inevitable result of medical science grounded in animal experimentation, several paediatric experimenters offered explicit justifications for their use of institutionalized children in clinical trials of new vaccines and diagnostic tests.³ All parties active in the debate over vivisection agreed in theory on the necessity of therapeutic human

experimentation in which experiments were performed with the expectation of benefiting individual patients. In practice, however, the distinction between therapeutic experiments and non-therapeutic research protocols designed to enhance medical knowledge proved problematic. Discussions about trials of new vaccines and diagnostic tests reveal the considerable ambiguity that invested both professional and public responses to using 'orphans as guinea pigs'.

Paediatric experimentation, both therapeutic and non-therapeutic, was more extensive than some historians have allowed.⁴ Some experiments in which children participated involved substantial risks, yet to assume that physicians were unconcerned with risks is mistaken. Evaluation of risk and discomfort from untried drugs and procedures and the potential of therapeutic benefit were critical considerations for most physicians. In some cases experimenters misconstrued the nature of the risks and dangers for child participants. In the development of vaccines, for example, a major focus of research in this period, physicians sometimes exposed children to greater risks from the vaccine than the potential risk of acquiring the disease in the institution. As in the introduction of the Salk vaccine for polio in the 1950s, investigators were not always the best judges of the safety and efficacy of a biological product.⁵

Experimentation with child subjects did not begin in the late nineteenth century. Perhaps one of the most famous incidents in the history of American medicine, the introduction of variolation for smallpox, involved initial testing on children. In 1721, at the instigation of the Puritan divine Cotton Mather, Zabdiel Boylston first attempted variolation against smallpox on those close at hand, his six-year-old son and his two slaves.⁶ After three weeks, presumably satisfied with the success of the procedure, Boylston variolated his second son.

Smallpox outbreaks provided the occasion for continued experimentation with institutionalized children. In the introduction of vaccination with cowpox for smallpox, children in almshouses and the offspring of physicians were again among the first to receive the vaccine. When Benjamin Waterhouse, who played a leading role in the introduction of vaccination in the United States, received his initial shipment of vaccine from London, he first administered it to his own son.⁷ In Philadelphia in 1802 when smallpox again visited the city, Thomas C. James, accoucheur to the almshouse, tested the Jennerian vaccine on forty-eight of the children under his care. He later challenged their

immunity to the disease by inoculating the same children with smallpox.⁸

Similar, but unsuccessful, attempts were made to immunize children against another childhood disease, measles. In 1905 Ludvig Hektoen, director of the McCormick Institute for Infectious Diseases in Chicago, reported at least three attempts by American physicians to produce immunity from the disease. The earliest case instanced a Rhode Island physician who in 1799 inoculated 'three young persons in his circle'; the other two cases involved physicians charged with the care of orphans.⁹ Nathaniel Chapman, who in medical studies abroad learned of attempts to produce immunity from measles, returned home and undertook a series of investigations in 1801 with children at the Philadelphia Almshouse. Chapman attempted in vain to inoculate children with blood, tears, and the material from skin eruptions of other children already infected with measles. Indeed, Chapman's lack of success in infecting children with the disease led him to conclude that measles was in fact non-contagious.¹⁰

Five decades later a Chicago physician made a series of measles inoculations involving children from the local orphan asylum where a measles outbreak had erupted. Using blood drawn from children already ill with measles, John E. M'Geer inoculated three children in the asylum. When these children developed mild cases of measles, M'Geer proceeded with additional injections, concluding that inoculation was effective in producing a milder case of measles than the children would have experienced otherwise during the epidemic.¹¹

M'Geer's services to the two Chicago orphan asylums reflected a new pattern of social organization in the middle decades of the nineteenth century. Beginning in the 1830s, the number of institutions devoted to the care of children grew rapidly throughout the United States.¹² Although children had received care in the general almshouses, orphan asylums were virtually unknown in the eighteenth century. Concern about the high mortality of infants and young children in the general almshouses (in some institutions as high as 80 per cent) led social reformers and philanthropists to create foundling homes and hospitals to care for both indigent mothers and their offspring.¹³

Childhood itself became a locus of meliorist energies at mid-century. In the face of changes wrought by urbanization and industrialization, reformers and philanthropists looked to carefully

designed institutions they hoped would re-educate the children of depraved, intemperate, and impoverished parents. In addition to caring for the spiritual needs of children, many child-saving institutions secured the services of an attending physician to see to the children's medical needs. Some medical superintendents, confronted with the challenges of group care and opportunities for systematic testing, reported the results of modest experiments with their young charges. These reports reflected both the nascent interest in numerical methods and the on-going conflicts between medical sectarians that characterized mid-century medical practice.¹⁴ Concerns about the large numbers of children on urban streets and the poor quality of life for children in the almshouses continued to make construction of orphanages a priority for many social reformers. Although Charles Loring Brace's New York Children's Aid Society began in 1854 to send economically productive children to farms in New York and the Middle Western states, younger children and children whose poor health made them unattractive candidates for foster care remained a source of concern.¹⁵ Beginning in mid-century, philanthropists and physicians jointly established the first children's hospitals in the United States. Concentrated primarily in the north-eastern United States, these specialized medical facilities, like other nineteenth-century hospitals, initially embodied the desires of reformers to provide moral training, as well as medical care, for the poor.¹⁶

Paediatric hospitals also provided physicians with both opportunities to study the diseases of children and occasions to secure appointments as hospital physicians. As Charles E. Rosenberg has argued, in an era before formal clinical training and board certification, hospital appointments offered invaluable experience and a means of entry into an urban clinical élite.¹⁷ Hospitals moreover permitted a concentration of paediatric patients that offered physicians the opportunity to pursue studies of children and their diseases. Although interest in clinical studies reflected the aspirations of only a small segment of the American medical profession, these élite physicians increasingly dominated professional discourse through the establishment of specialty societies and the reorganization of medical education.

In exchange for the charitable benevolence of wealthy patrons and élite physicians, patients in nineteenth-century hospitals served as 'clinical material' for physicians and medical students. Edward Atwater has observed, 'teaching was, almost without exception, one

of the reasons physicians gave for promoting hospitals'.¹⁸ Physicians offered their services in part for the privilege of bringing medical students along for instruction. Indeed medical schools emphasized their access to interesting and 'abundant clinical material' in hospitals and dispensaries as a means of drawing students.¹⁹ Hospital managers also exploited the educational possibilities in campaigns for funds. The Boston Children's Hospital (established in 1869) attracted wealthy supporters by appeals to the 'double interest' for patrons in the institution: 'not only on account of the great benefit it will confer on its little inmates, but also because of the advantages it offers for the study of special diseases by which their offspring may be afflicted'.²⁰ However, using patients for the purposes of teaching was not always unproblematic. Although conflicts between physicians and lay managers of hospitals periodically erupted over the instrumental use of patients, many physicians and hospital administrators agreed that in the United States patients were rarely subjected to the abuses suffered by patients at the hands of German physicians.²¹

Just as there was friction between the hospital's teaching function and its role in providing patient care, the pursuit of research and the care of patients in the hospital were seen as potentially in conflict. In his 1886 Boylston Prize essay, a Boston physician C. F. Withington identified some problems and solutions in the use of hospitals for both education and research. Patients, he suggested, might have to serve as subjects in therapeutic experiments, given the uncertain state of medical knowledge.²² These same patients, he argued, had the right to expect immunity from non-therapeutic experiments in which benefit for themselves was not anticipated. He acknowledged that enthusiastic physicians occasionally violated the rights of hospital patients. Indeed his discussion was a response to an 'egregious usurpation' involving two English physicians, Sydney Ringer and William Murrell, who administered a number of drugs to hospital patients in order to study their reactions to purified dosages of commonly prescribed medications.²³ Withington's objections to the English trials stemmed from the discomfort and pain suffered by the patients, who received the medications without their knowledge or permission.

Withington conceded that not all researches involved discomfort or danger for patients. In cases in which a physician wished to obtain, for example, such benign information as thermometer readings or the normal conditions of the reflexes, he maintained that performing such measurements without permission was

unobjectionable: 'If the physician were to ask these things as a favor, few, if any, patients would refuse him, and if as a matter of convenience he takes them as a right, no harm was done.'²⁴ In Withington's view, the obligation to do no harm to patients took precedence over all other considerations. When discomfort or harm did not pose a problem, physicians were free to pursue their enquiries.

Many American physicians shared this distinction between acceptable and unacceptable non-therapeutic experimentation, at least in theory. In cases in which a benefit was not intended for the individual patient involved, risk avoidance assumed priority, even in instances in which patients permitted experimental procedures known to possess substantial risks.²⁵ However, in at least some cases, the fact that a previously untried procedure or drug would subsequently prove to be harmless (and valuable) was sufficient to exonerate a physician from charges of misconduct.²⁶ One of the most discussed examples of paediatric experimentation at the turn of the century illustrates the considerable ambiguity that characterized interpretations of appropriate use of children as subjects of medical research.

In August 1896 Arthur Howard Wentworth, a recent graduate of the Harvard Medical School and outpatient physician to the Children's Hospital in Boston, reported results from forty-five lumbar punctures on infants and children. Wentworth explained that he first performed the operation of tapping the spinal canal on a child with a questionable case of tubercular meningitis. Although the child proved free of disease, she responded unfavourably to the puncture, leading Wentworth to suspect that the spinal tap was not as harmless as many believed. He then resolved to attempt 'control experiments on normal cases', explaining:

The diagnostic value of puncture of the subarachnoid space is so evident that I considered myself justified in incurring some risk in order to settle the question of its danger. If it proved to be harmless, then one need not wait until a patient becomes moribund before resorting to it.²⁷

He subsequently withdrew spinal fluid from twenty-nine children ranging in age from a few months to a few years, concluding that although 'the momentary pain of the puncture' caused children occasionally to shrink back and cry out, the procedure itself was harmless and would prove to be a useful diagnostic tool.²⁸ The fact that Wentworth's prediction about the clinical utility of lumbar

puncture proved accurate should not obscure the uncertainties and risks that confronted physicians in 1896.²⁹

Wentworth presented his results to both the Suffolk County Medical Society and the American Pediatric Society in 1896 where he received encouraging responses. Publication of the article, however, provoked an angry editorial in the *Philadelphia Polyclinic*. John B. Roberts labelled Wentworth's procedures 'human vivisection', reminding his readers:

It must be remembered that there were no therapeutic indications for the operation such as often lead us to justly and properly adopt operative treatment, the positive value of which is still undetermined. These operations were purely and avowedly experimental.³⁰

Roberts rebuked Wentworth for using hospitalized children without explaining his plan to their mothers or gaining their permission, and thus fostering fear of hospitals, a prejudice he identified as already deeply rooted among the poor.

Wentworth's experimental procedures and, perhaps more importantly, Roberts' criticism of the lumbar punctures did not escape the attention of anti-vivisectionists and vivisection reformers. Although the relationship between human and animal experimentation may seem obscure today, late nineteenth-century animal protectionists saw the two as intimately, if not causally, related.³¹ Opponents of unrestricted animal experimentation insisted that protracted exposure to animal vivisection blunted compassion for human beings. Frequently cited was the warning by an Illinois jurist, A. N. Waterman: 'To whomsoever, in the cause of science, the agony of a dying rabbit is of no consequence, it is likely that the old or worthless man will soon be a thing which in the cause of learning may well be sacrificed.'³² Anti-vivisectionists warned that it was a short step from the animal kennels to the hospital charity wards where unsuspecting patients would be used in experiments.³³

In October 1897 at the annual meeting of the American Humane Association, Albert Tracy Leffingwell, a prominent advocate of vivisection reform, warned the delegates that human vivisection, the use of human beings in non-therapeutic experiments without their knowledge or consent, had already begun.³⁴ Although his concern was provoked by the work of an Italian physician G. Sanarelli, whose inoculations of five people with the purported bacillus of yellow fever also prompted censure by William Osler, Leffingwell

identified two American examples of human vivisection, including Wentworth's experiments at the Children's Hospital.³⁵

In preparation for a hearing on proposed legislation to restrict experimentation involving animals in the District of Columbia, the American Humane Association in 1899 circulated a pamphlet on human vivisection in which Wentworth's 'vivisections of children' figured prominently.³⁶ In addition to Sanarelli's yellow fever experiments and the lumbar punctures, the circular described nine experiments involving children in institutions in Hawaii, England (Ringer and Murrell), Austria, Germany and Sweden. Perhaps the most notorious case involved a Swedish physician. When Dr Jansen of the Charity Hospital in Stockholm began experiments with 'black smallpox pus' he preferred to use calves, which were only obtainable at considerable cost. He reported that it was cheaper to use the children at a local foundlings' home.³⁷

Together with newspaper accounts of experiments involving children in European hospitals, the Senate hearings and charges of 'murder in the name of science' compelled several prominent physicians to respond.³⁸ Alarmed by publicity generated by charges of child vivisection and fearful that such attention would lead to restrictions on animal experimentation like those enacted in Great Britain, several leading Boston physicians met to discuss the Wentworth situation. Wentworth had been scheduled to testify at a legislative hearing in Boston on animal experimentation, but he did not appear. None of his colleagues publicly defended the research, and Wentworth resigned quietly from Harvard, though he did retain his posts at the Children's and Infants' Hospitals.³⁹

Wentworth's explicit identification of the lumbar puncture procedures as experiments involving 'normal cases' made him a notable target for anti-vivisectionist criticism. In the next two decades, such prominent anti-vivisectionists as Caroline Earle White, president of the American Anti-Vivisection Society, and Diana Belais, president of the New York Anti-Vivisection Society, continued to accuse the Boston paediatrician of human vivisection and to censure the medical profession for not joining in their condemnation of his work. Notable for her histrionic garrulity, Belais went so far as to accuse Wentworth of causing the deaths by spinal puncture of the children under his care.⁴⁰

Misrepresentation of Wentworth's experiments and the recognition that the lumbar punctures embodied potentially influential propaganda for the anti-vivisectionist cause led William Williams

Keen, a Philadelphia surgeon long active in defence of research activities, to defend Wentworth on several occasions.⁴¹ Encouraged by the case of William Bayliss, a British physiologist who won a libel suit against an anti-vivisectionist, Keen urged Wentworth to consider legal action against Caroline White and the *Journal of Zoophily*. When Wentworth declined this suggestion, Keen also wrote to John B. Roberts, author of the editorial ubiquitously cited in human vivisection tracts that criticized the lumbar punctures, asking whether the proven safety and efficacy of the procedure had modulated his views about Wentworth. Roberts, though sympathetic to the request of his former teacher, regretfully declined to retract his criticism.⁴²

Although Wentworth explicitly used 'normal cases' to verify the safety of an untested procedure, lumbar puncture proved to be both safe and effective for diagnostic purposes. The fact that Wentworth did not harm his patients counted heavily in his favour, even though it was not a therapeutic procedure. Whereas physicians and most anti-vivisectionists agreed that experiments conducted to benefit an individual patient were not only ethical but necessary to continued progress in medicine, the separations between the acquisition of new information, diagnosis and treatment were frequently debated. The disparity of views on experiments conducted for the purposes of developing new diagnostic tools and vaccines loomed large in the subsequent controversy over two additional cases of 'human vivisection' involving orphans and hospitalized children: the testing of tuberculin for the diagnosis of tuberculosis and trials of luetin for the diagnosis of syphilis.⁴³

In 1908 three Philadelphia physicians, Samuel McClintock Hamill, Howard C. Carpenter and Thomas A. Cope reported the results of comparisons of several diagnostic tests for tuberculosis.⁴⁴ These tests involved administration of tuberculin to different sites in the body: conjunctiva (Calmette); deep muscle (Moro); and skin (von Pirquet). Under the heading 'material used', Hamill and his colleagues described their subjects as children under eight years of age, all but 26 of whom were inmates of St Vincent's Home, 'an institution with a population of about 400, composed of foundlings, orphans, and destitute children'.⁴⁵ Hamill and his associates tested the orphans, deliberately deferring physical examinations of the children until diagnostic tests had been performed. This fuelled criticism that the children had been used merely as subjects regardless of their medical conditions.

The physicians explained that before beginning the conjunctival test, they were unacquainted with any adverse effects associated with the procedure. The ease of implementing the test (application of a few drops of tuberculin to the surface of the eye) and the relatively quicker results obtained thereby made it attractive to clinicians in search of an effective diagnostic tool. However, in the course of testing, several disadvantages quickly became manifest. The reaction produced a 'decidedly uncomfortable lesion' and in several cases, serious inflammations of the eye resulted. In addition, the possibility that permanent impairment of vision might result for several children worried the physicians. These disadvantages, together with adverse reports from more than fifteen other physicians, led Hamill's group to conclude:

we are strongly of the opinion that any diagnostic procedure which will so frequently result in serious lesions of the eye, irrespective of the way in which it produces them, has no justification in medicine, especially since there are other diagnostic tests of equal if not superior value, which are applicable to the same class of cases and not attended with the same serious results.⁴⁶

Routine tuberculin testing of the child population of St Vincent's Home revealed a large number of cases of previously unsuspected tuberculosis, an unsurprising outcome given the crowded conditions at the home and the poor nutritional status of many of the children. For these physicians, the 'experiments' thus provided an identifiable therapeutic benefit.

The dual purpose of the tuberculin testing at St Vincent's Home – both to diagnose disease in the children and to compare methods of instilling tuberculin – led American anti-vivisectionists to label the trials as examples of non-therapeutic experimentation. In response to the tuberculin tests, the Vivisection Investigation League, the New York Anti-Vivisection Society, and the Philadelphia-based American Anti-Vivisection Society issued pamphlets compiled from the extracts of reports of the tuberculin tests from the medical literature.⁴⁷ Consistent with anti-vivisectionist reliance on visual representations, two of the circulars included coloured pictures reproduced from Hamill's report of children's eyes inflamed by tuberculin. In addition, Diana Belais wrote an article for *Cosmopolitan* that described the tuberculin tests and presented photographs of Kitty Logan, 'Little Catherine' and Agnes

Morgan, three young inmates from St Vincent's Home (see illustrations 4.1 and 4.2).⁴⁸

Belais challenged the therapeutic status of tuberculin testing of the children of St Vincent's. Not only had Hamill, Carpenter and Cope failed to state or even imply benefit to the children, Belais argued, their own report 'even to a layman' suggested that the tests were in 'the nature of experiments in diagnostic values'.⁴⁹ Belais also denounced the 'cold professional terms' used by physicians to describe the reactions of the children and labelled the tests of the conjunctival application unnecessary, in the light of Hamill's own citation of multiple reports of discomfort and injury from other physicians. Anti-vivisectionists consistently criticized experimental medicine on these grounds, claiming that most researchers only repeated the work of other investigators and, even then, failed to produce a useful consensus about the value of a particular procedure or experiment.

Belais's objections to Hamill's tests persisted in accusations of human vivisection against an eminent New York paediatrician, L. Emmett Holt. In January 1909 Holt, a professor of diseases of children at Columbia University's College of Physicians and Surgeons, reported results of another series of comparisons of tuberculin tests involving infants at New York Babies' Hospital.⁵⁰ The repetition of earlier experiments disturbed anti-vivisectionists, but perhaps more distressing was the perceived clinical detachment with which Holt described the results of tuberculin tests on 'dying children':

With a callousness somewhat astonishing even to one versed in the writing of vivisectionists, this particular representative of the species seems to feel no hesitancy whatever in referring to this strange use of sick and dying babies.⁵¹

For critics of human vivisection, issues of insensitivity to the human subjects of research and the redundancy of such experiments recurred in other reports of comparisons of tuberculin administration.⁵² References to patients as 'material' and expressions of gratitude to staff physicians who allowed investigators 'use of material' led the American Anti-Vivisection Society to charge: 'quotations clearly indicate that after these tests were found to be distinctly dangerous the experiments still continued and "material" was freely furnished by authorities of various public institutions'.⁵³



4.1 Kitty Logan – human guinea pig

Source: Diana Belais, 'Vivisection – animal and human', *Cosmopolitan*, 1910, 49: 271.



4.2 Experimental 'material' from St Vincent's Home, Philadelphia
Source: Diana Belais, 'Vivisection – animal and human', *Cosmopolitan*, 1910, 49: 273.

Clinical trials of diagnostic tests for tuberculosis were not the only focus for critics of human vivisection. At the Rockefeller Institute for Medical Research, a consistent target of anti-vivisectionist activity, Hideyo Noguchi's development of a diagnostic test for syphilis, similar to tuberculin, using orphans and hospital patients as subjects and controls provoked considerable outcry in the years 1912-14.⁵⁴

Noguchi's use of children and hospital patients to test for the presence of a disease only recently mentionable in polite company angered New York anti-vivisectionists. However, they directed comparatively little criticism at the researcher, preferring to focus on the physicians and medical superintendents whose 'courtesy' allowed Noguchi access to their patient populations. Thus, both the Vivisection Investigation League and the American Anti-Vivisection Society, avid to identify the 'medical conspirators', published in full the names and hospital affiliations of the physicians who provided Noguchi with subjects.

Disturbed by Noguchi's report that he used 46 normal children between the ages of two and eighteen as controls, the president of the New York Society for the Prevention of Cruelty to Children instituted a formal complaint against Noguchi on charges of battery. Although the district attorney's office declined to prosecute Noguchi on such charges, accusations of human vivisection continued. As in the case of Wentworth and the tuberculin testers, defenders of medical research found such charges difficult to understand. Two factors influenced the medical interpretation of Noguchi's trials. First, the administration of the inactivated solution of luetin did not injure the children. Although application of the luetin did cause minor irritation, it was certainly less than that occasioned by the Calmette eye test.⁵⁵ Perhaps more important, Noguchi's defenders argued that the test application was therapeutic in intent in spite of Noguchi's use of the word 'control'. According to Noguchi's supporters, the test allowed the seemingly normal children to receive treatment for the disease, treatment which would not have been given if not for the diagnostic value of the luetin test.

The tumult over human vivisections involving tuberculin and luetin led Walter Bradford Cannon, the chair of the American Medical Association's Council on the Defense of Research, to enlist the aid of a young Philadelphia physiologist to answer the accusations of human vivisection. Richard Mills Pearce's analysis of human

vivisection was the only pamphlet in the defence of research series that expressly addressed the ethics of human experimentation.⁵⁶

Responding to charges against Hamill, Pearce explained that Hamill had conferred with other physicians before embarking on the trials, thus countering the claim that the trials were undertaken without careful consideration. He challenged the assumption that the use of orphans, foundlings, and destitute children implied that the consent of guardians had not been sought. Pearce explained that Hamill had approached the directors of St Vincent's and secured co-operation for the purposes of both determining the incidence of tuberculosis in the asylum and the simultaneous comparative study of the different methods of applying tuberculin. Hamill insisted that the sisters had readily assented to the plan, even though public criticism interfered with continued testing of the children.⁵⁷ On the issue of Hamill's conclusions about the undesirability of the ophthalmic test, Pearce pointed to the fact that the eye test continued to enjoy some support among physicians, despite the discomforts and dangers associated with it.⁵⁸

Pearce did acknowledge as 'difficult to excuse' one set of experiments by an American physician cited by critics of human vivisection. He explained that the clinical experiments of Dr J. W. Stickler, a New Jersey physician, who in 1887 inoculated several children with 'virus' of foot-and-mouth disease in the belief that this would confer immunity to scarlet fever, were not unlike the experiments undertaken by Edward Jenner in seeking a preventive inoculation against smallpox.⁵⁹ He conceded that increased knowledge of the infectious diseases in the 1880s could not justify Stickler's methods, but expressed confidence that one isolated observation made twenty years earlier could not be held up as an indictment of current American medical research practices.⁶⁰

Although Hamill chose not to respond to critics of tuberculin testing, L. Emmett Holt wished to address his accusers directly. Angered by newspaper reports that he injected dying babies with tuberculin, Holt consulted Simon Flexner, the scientific director of the Rockefeller Institute and an active ally of Cannon in the defence of research, about an appropriate response to the accusations. Citing the fact that the New York anti-vivisectionists had been largely discredited by revelations of inaccuracy and misrepresentation in charges of human vivisections at two New York hospitals, Flexner advised Holt not to respond.⁶¹ Renewing the controversy over the tuberculin tests, he argued, could only serve to reopen the

problematic questions of consent for non-therapeutic procedures that arose in the context of Noguchi's tests of luetin.

Perhaps more to the point, Flexner reminded Holt that his explanations of the tuberculin tests did not answer one of the primary criticisms of the tuberculin tests:

one of their chief arguments [is] that in the beginning the test was applied to children who were not supposed to be suffering from tuberculosis. They of course overlook the fact that the application of the test discovers at times tuberculosis which is unsuspected but since your article does not discuss the question of controls they would not feel you had met the issue.⁶²

Flexner's advice reflected a consistent preference on the part of defenders of medical research to avoid whenever possible discussing the ethical ambiguities of clinical research involving humans, especially in situations in which continued public support for animal experimentation without restrictions was at stake.⁶³

Despite this advice, Holt chose to respond after newspapers continued to print stories on the tests at Babies' Hospital. Contrary to his research report, Holt denied both that he had tested children irrespective of their ailments and that he had tested dying children. He did not address the issue of controls.⁶⁴ If he had done so, he would have had to acknowledge that in order for a diagnostic test to be useful, it must give a negative response in tests of patients known to be free of the disease. In such cases, the test might pose little risk but neither could a therapeutic benefit be expected or defended.

Much of the discussions about the use of children in the development of diagnostic tests, new procedures, or even confirmation of the etiological status of a newly identified microbe, reflect the polemics of the controversy over animal experimentation in this period. Committed to preventing legal restrictions on animal vivisection, defenders of medical research not surprisingly directed their energies to undermining their opponents, branding anti-vivisectionist criticism as misguided and vivisection reform as unnecessary. Defenders of medical research hoped to preempt further condemnation of the use of human subjects through closer attention to research reports, the major source of anti-vivisectionist propaganda. Cannon, for example, circulated a letter among editors of medical journals asking that particular attention be directed to reporting details of anaesthetic use and post-operative care in the

case of animal vivisection and the details of individual consent or the permission of guardians in reports involving human beings.⁶⁵

Cannon continued to monitor situations in which references to experimentation involving human beings, and children in particular, could be misunderstood. In alerting the manager of the Rockefeller Institute to an advertisement of a glycerinated vaccine virus 'physiologically tested on children before being placed on the market', Cannon maintained that the public would not countenance anything that could be interpreted as experimenting on children which was not for the good of the children themselves.⁶⁶ Most of the defence of research materials promoted the idea that medical science was the only way in which progress could continue, and that any restrictions on animal or human experimentation would not be in the best interests of humanity.

Anti-vivisectionists, for their part, believed that focus on human vivisection would further their efforts to gain popular support for legislative restrictions on the use of animals in research. Thus, legislation to restrict experimentation on human subjects was introduced with the view of publicizing the link between animal and human vivisection and the necessity for restrictions on the laboratory use of animals.⁶⁷ This commitment to animal protection may explain in part the anti-vivisectionists' disinclination to produce examples of human vivisection other than the small number which were continually cited in their literature, a repetition for which they were often criticized.⁶⁸ Reiteration of such human vivisections as those of Wentworth and Holt reflected their belief that human vivisection was not commonly practised by American physicians. It may also be a consequence of their method for identifying cases of human vivisection, namely reliance on newspaper reports of new medical discoveries. Perhaps believing that Wentworth's procedures or Noguchi's tests served as compelling representative illustrations, anti-vivisectionists did not pursue systematic exploration of the extent of paediatric experimentation. Had they done so, they would have discovered that the practice was much more common than they believed. Their critics suggested an alternative explanation, namely that anti-vivisectionists were more committed to the protection of animal welfare than to that of children.

To what extent were American children used as subjects in the development of new drugs, procedures, tests, and vaccines in this period? The literature of the human vivisection controversy provides citations to child participation in the development of a

SCHOOL DAYS

NEARLY 25 million children will enter the public schools in the United States in September. The intimate contact, incident to school life, is one of the most potent factors in the production and spread of disease.

LEDERLE'S Glycerinated Vaccine Virus is physiologically tested on children, before being placed on the market, thus insuring an active and potent product. The LEDERLE collapsible tube affords the simplest known means for administering the virus.

Send for illustrated booklet.

Lederle Antitoxin Laboratories
Schieffelin & Co., Distributors
New York

4.3 'School Days' - advertisement for vaccine product tested on children, 1914

Source: *American Journal of Public Health*, February 1914: 2.

vaccine for tuberculosis (the von Ruck vaccine tested on children in a North Carolina orphanage), the use of newborn infants to discern the mechanisms of gastric hunger, the use of additional children from St Vincent's to study infection with a contagious skin disease (*molluscum contagiosum*), and the use of children to establish the cause of whooping cough.⁶⁹

In addition to these reports, a survey of one paediatric journal for the years 1911-16, at the high point of controversy over the vivisection of children in hospitals, reveals sixty-eight reports describing the use of child subjects. Given an unknown rate of experiments performed but not reported, this suggests that paediatric experimentation was not a rare occurrence.⁷⁰ These reports allow limited information about the circumstances under which experiments were undertaken. Few physicians explicitly noted parental involvement. In 1912, for example, two prominent American investigators related how they obtained infants for calorimetric studies through the directory of wet nurses at the Boston Babies' Hospital, studies for which mothers were present the entire time.⁷¹ Failure to mention parental permission does not necessarily mean parents were not consulted, but it may reflect the fact that many of the children used in hospitals and asylums were orphans, either literally or socially. The use of the word 'material' to describe paediatric patients, so repellent to critics of human vivisection, was not uncommon.⁷² Whether this usage reflects the conventions of medical communication or the social distance between indigent patients and elite physicians is difficult to assess.⁷³

Considerable attention was devoted to technical difficulties in pursuing research with paediatric patients. The collection of blood and the products of metabolism in infants and young children was impeded by their smaller size and 'unruly' behavior. Efforts to achieve compliance with research protocols in some instances may have placed children at greater risk than the experimental procedure itself. For example, when a child's activity interfered with attempts to obtain results of normal electrical response to galvanic current, investigators reported that 'constant resistance necessitated mild chloroform narcosis in a few cases'.⁷⁴ Other physicians reported that in 'unruly infants' X-ray studies of normal anatomy and physiology of the infant stomach necessitated the use of anesthesia.⁷⁵ Metabolic studies involved restraining infants and young children on a metabolic frame for a considerable period of time. In one study of a baby with a 'rather happy disposition'

investigators placed the infant on a metabolic frame for a second period of 'prolonged confinement' of seven days. After the baby lost weight, the investigators removed the child from the frame despite his lack of obvious discomfort, noting they 'carried the observation as far as was advisable with a human subject'.⁷⁶

Given the difficulties associated with experiments involving uncooperative and uncomprehending subjects, why would physicians undertake researches on children? To some extent the research problem dictated the choice of research subject. In the case of tuberculosis, the ubiquity of adult infection in early twentieth-century America led several investigators to attempt to develop a prophylactic vaccine for artificial immunity against the disease.⁷⁷ These researches necessarily involved subjects as yet uninfected, generally children. The introduction of live or attenuated vaccine into children free of the disease in the name of an anticipated, if uncertain, future immunity worried some physicians. In 1912 the respected Colorado physician Gerald Webb acknowledged his uneasiness about 'inoculating the uninfected' with a live tubercle bacillus vaccine. Only extraordinary circumstances and parental permission convinced Webb to try the experiment on the two young children (aged 9 months and 3 years) of 'a distinguished scientist dying of tuberculosis'.⁷⁸

Researchers at times looked to child subjects for explanations of phenomena observed under different conditions in adults. For example, when the safety of chemical food additives came under investigation in 1908, the Referee Board of Consulting Scientific Experts conducted extensive clinical experiments using adult volunteers.⁷⁹ Questions about the action of the preservative sodium benzoate in young children led to clinical experiments involving infants fed artificial milk containing the additive.⁸⁰ Other investigators looked to studies of infants and children for comparisons with adult physiology. The physiologist A. J. Carlson and his group at the University of Chicago undertook extensive studies of human digestion in the first two decades of the twentieth century. In addition to auto-experiments, investigators used a 'professional adult subject' and normal infants in physiological studies of hunger in health and disease.⁸¹

Paediatricians, especially those entrusted with the care of institutionalized children, had additional reasons for experimentation. Confronted with high rates of morbidity and mortality, physicians sought to develop both preventive and therapeutic means to

improve the health of their charges. In some cases, an interest in experimentation could not be separated from the desire for professional advancement. Medical discoveries enhanced careers. Some paediatricians no doubt hoped to have their names immortalized in an eponymous diagnostic test or vaccine.⁸² These desires, and the accessibility of children for systematic experimentation, may have contributed to greater risks for institutionalized children.

The instrumental use of orphanage children is well illustrated in the work of Alfred F. Hess, a prominent New York paediatrician, who conducted extensive research involving children housed in the Hebrew Infant Asylum in New York City.⁸³ In several papers, Hess acknowledged the advantages of studying certain problems within the confines of a custodial institution. In reporting trials of a prophylactic vaccine for pertussis, Hess observed:

It is probably also of advantage, from the standpoint of comparison, that these institutional children belong to the same stratum of society, that they have for the most part been reared for a considerable period within the same walls, having the same daily routine, including similar food and an equal amount of outdoor life. These are some of the conditions which are insisted on in considering the course of experimental infection among laboratory animals, but which can rarely be controlled in a study of infection in man.⁸⁴

The availability of children at the asylum led Hess to pursue extensive studies of the anatomy and physiology of digestion in infants. In 1911 he reported the development of a duodenal tube for infants which could be used to sample gastric secretions. Although conceding the difficulty of predicting the value of any new agent, he subsequently used the instrument in a number of studies of both normal and diseased infants and children.⁸⁵

Hess's reports of the use of balloon catheters, X-rays, duodenal tubes, and other apparatus to study the process of normal digestion in children do not contain evaluations of risks to participants. Despite the fact that dangers associated with X-ray exposure were known to practitioners, there continued to be ambiguity about what levels of exposure constituted harmful levels of radiation.⁸⁶ In fact, children were used as subjects in a number of experiments involving X-rays in which risk from participation was deemed unremarkable. In one instance,

however, risk to orphans at the Hebrew Infant Asylum in Hess's researches on nutrition did generate one of the few critiques of paediatric experimentation in this period that was not associated with anti-vivisectionists.

In 1921 Konrad Bercovici, a social worker and journalist, criticized Hess and his associate Mildred Fish for using 'orphans as guinea pigs' in studies of dietary factors in rickets and scurvy.⁸⁷ Bercovici described Hess's studies on scurvy, which involved withholding orange juice from institutionalized infants until they developed the characteristic haemorrhages associated with the disease.⁸⁸ He also quoted the employment of similar methods by Hess and his associates to discover a diet that would induce rickets.⁸⁹ Although Bercovici acknowledged the importance of studying the effects of different diets on children, he explicitly rejected the methods in producing the disease in non-volunteers, especially when some of the children did not fully recover from the effects of the disease:

no devotion to science, no thought of the greater good to the greater number, can for an instant justify the experimenting on helpless infants, children pathetically abandoned by fate and intrusted to the community for their safeguarding. Voluntary consent by adults should, of course, be the *sine qua non* of scientific experimentation.⁹⁰

Bercovici's assessment of Hess's experiments seemingly generated no further discussion, either among physicians or among members of the public.

Bercovici's efforts to separate himself from other critics of the medical profession, 'the anti-vivisection freaks and the various cranks and fanatics', suggests by 1921 the marginalization of anti-vivisectionist critics of human vivisection. However, his analysis of the medical use of orphans at the Hebrew Infant Asylum reflected similar concerns about child welfare, namely the absence of therapeutic benefit and the potential for permanent injury for the child participants. American physicians shared in theory these commitments to therapeutic potential and minimization of risk. However, definitions of therapeutic potential in this period proved exceptionally elastic and risk assessment especially problematic. In the name of child welfare, physicians performed considerable experimentation, not always in the best interests of their child subjects.

ACKNOWLEDGEMENTS

I would like to thank V. Carchidi, D. Barnard, J. Watson and R. Cooter for their generous assistance.

NOTES

- 1 See V. A. Zelizer, *Pricing the Priceless Child*, New York: Basic Books, 1985.
- 2 See S. M. Lederer, 'Human experimentation and anti-vivisection in turn-of-the-century America', Ph.D. thesis, University of Wisconsin, 1987.
- 3 The American anti-vivisection movement encompassed both those adamantly opposed to any experimentation involving living animals and those who labelled themselves vivisection reformers, i.e. willing to accept vivisection with certain restrictions. See S. E. Lederer, 'The controversy over animal experimentation in America, 1880-1914', in N. A. Rupke (ed.) *Vivisection in Historical Perspective*, London: Croom Helm, 1987: 236-58.
- 4 See M. A. Grodin and J. J. Alpert, 'Children as participants in medical research', *The Pediatric Clinics of North America*, 1988, 35: 1389-1401, and D. J. Rothman, 'Ethics and human experimentation', *The New England Journal of Medicine*, 1987, 317: 1195-9. Grodin, Alpert, and Rothman argue that paediatric experimentation was rare before the Second World War. For an opposing view, see R. G. Mitchell, 'The child and experimental medicine', *British Medical Journal*, 21 March 1964: 721-7, and M. S. Frankel, 'Social, legal and political responses to ethical issues in the use of children as experimental subjects', *Journal of Social Issues*, 1978, 34: 101-13, who state that orphanage children were commonly used as subjects in the late nineteenth century. These articles, however, are little more than brief surveys of the history of child experimentation.
- 5 A. M. Brandt, 'Polio, politics, publicity and duplicity: ethical aspects in the development of the Salk vaccine', *Connecticut Medicine*, 1979, 43: 581-90.
- 6 J. B. Blake, 'The inoculation controversy in Boston, 1721-22', in J. W. Leavitt and R. L. Numbers (eds) *Sickness and Health in America*, Madison: University of Wisconsin, 1985: 348.
- 7 J. B. Blake, *Benjamin Waterhouse and the Introduction of Vaccination: a reappraisal*, Philadelphia: University of Pennsylvania, 1957: 14-15.
- 8 In New York, Boston and Baltimore, almshouse children were also among the first to receive the vaccine. S. X. Radbill, 'The use of children in pediatric research', paper delivered at AAHM, Pittsburgh, PA, 4 May 1979. Also S. X. Radbill, 'Centuries of child welfare in Philadelphia', *Philadelphia Medicine*, 1975, 71: 279-91, 319-27.
- 9 L. Hektoen, 'Experimental measles', *Journal of Infectious Diseases*, 1905, 2: 238-55. Hektoen also cites the efforts of Hungarian, Italian, German, and English investigators to produce measles immunity in

- children. Dr Green of Greenwich, Rhode Island, is discussed in J. Stewart, *A Practical Treatise on the Diseases of Children*, New York: Langley, 2nd edn, 1844: 416.
- 10 W. P. Dewees briefly cites Chapman's lectures on the non-contagiousness of measles in *A Treatise on the Physical and Medical Treatment of Children*, Philadelphia: H. C. Carey and I. Lea, 1825: 471. See Raddbill, 'Centuries of child welfare': 369.
 - 11 J. E. M'Geer, 'Inoculation in rubeola', *Eclectic Medical Journal*, 1851, 10: 322-4. Hektoen cites him as McGirr in 'Experimental measles': 249. See J. H. Cassedy, *American Medicine and Statistical Thinking, 1800-1860*, Cambridge, Mass: Harvard University, 1984: 138.
 - 12 See D. J. Rothman, *The Discovery of the Asylum: social order and disorder in the new republic*, Boston: Little, Brown, 1971: 208-36.
 - 13 P. C. English, 'Pediatrics and the unwanted child in history: foundling homes, disease, and the origins of foster care in New York City, 1860-1920', *Pediatrics*, 1984, 73: 699.
 - 14 Cassedy describes how the homeopath C. Wright in 1842 eliminated all but homeopathic treatments for the children in New York City's Protestant Half-Orphan Asylum and reported the results. Suspicious of Wright's success, James McCune Smith, the first American black with a medical degree and attending physician to the Free Negro Orphan Asylum in New York City, questioned Wright's results and accused him of turning away sick children as a means of improving the recovery rate. A decade earlier the medical director of the Albany Orphan Asylum instituted a vegetarian diet for the children after a systematic comparison of the health benefits accruing from adoption of the Graham system. See Cassedy, *American Medicine and Statistical Thinking*: 116-48.
 - 15 Brace's society placed more than 80,000 older children. See 'The Children's Aid Society of New York: its history, plan, and results', in National Conference of Charities and Corrections (comp.) *History of Child Saving in the United States*, Montclair, New Jersey: Patterson Smith, 1971: 30.
 - 16 S. A. Halpern, *American Pediatrics: the social dynamics of professionalism, 1880-1980*, Berkeley: University of California, 1988: 36-43.
 - 17 C. E. Rosenberg, *The Care of Strangers*, New York: Basic Books, 1987: 174-5.
 - 18 E. C. Atwater, 'Internal medicine', in R. L. Numbers (ed.) *The Education of American Physicians: historical essays*, Berkeley: University of California, 1980: 143-74 (quote appears on 151).
 - 19 Announcement of the Johns Hopkins Medical School for 1893. I am grateful to John Parascandola for this citation.
 - 20 Quoted in M. J. Vogel, *The Invention of the Modern Hospital, Boston 1870-1930*, Chicago: University of Chicago, 1980: 22.
 - 21 Some physicians conceded that in the past 'pauper patients' had been subjected to risks which would not have been incurred in the case of wealthier patients, but that it was exceedingly rare in 1900, see 'Experimental operations in hospitals', *American Medicine*, 1904, 8: 313. Also Lederer, 'Human experimentation': 112-14.

- 22 C. F. Withington, *The Relation of Hospitals to Medical Education*, Boston: Cupples, Upham, 1886.
- 23 The Ringer and Murrell affair is discussed in R. D. French, *Anti-vivisection and Medical Science in Victorian Society*, Princeton: Princeton University, 1975: 320-2.
- 24 Withington, *The Relation of Hospitals to Medical Education*: 17.
- 25 For example, in the demonstration of the role of the Aedes mosquito in the spread of yellow fever, Walter Reed expressed anxiety that volunteers would perish as a result of participation in research. Reed and his colleagues took pains to ensure that volunteers understood the risks they incurred, as well as the benefits of receiving the best supportive care in the event that they fell sick with the disease, by using written contracts. See W. B. Bean, 'Walter Reed and the ordeal of human experimentation', *Bulletin of the History of Medicine*, 1977, 51: 75-92.
- 26 G. L. Geison makes a similar point in 'Pasteur's work on rabies: reexamining the ethical issues', *Hastings Report*, 1978, 8: 26-33.
- 27 A. H. Wentworth, 'Some experimental work on lumbar puncture of the subarachnoid space', *Boston Medical and Surgical Journal*, 1896, 135: 133.
- 28 S. Benison, A. C. Barger and E. L. Wolfe list twenty-seven children as subjects. More significant, they downplay the experimental nature of the spinal taps, an aspect that Wentworth explicitly emphasized, *Walter B. Cannon: the life and times of a young scientist*, Cambridge, Mass: Belknap Press of Harvard University, 1987: 176-7.
- 29 Even today the procedure is not free from risks. Although serious complications are rare, common complications include local pain and headache. See J. R. Botkin, 'Informed consent for lumbar puncture', *American Journal of Diseases of Children* (hereafter *AJDC*), 1989, 143: 899-904.
- 30 J. B. R. [John B. Roberts], 'Human vivisection', *Philadelphia Poly-clinic*, 1896, 5: 357.
- 31 For a contemporary analysis of a possible correlation between animal abuse in childhood and subsequent cruelty to humans in adulthood, see S. R. Kellert and A. R. Felthous, 'Childhood cruelty toward animals among criminals and noncriminals', *Human Relations*, 1985, 38: 1113-29.
- 32 *Shall Science Do Murder?* (From the *Chicago Evening Post* of May 18, 1899), Providence, Rhode Island, 1899.
- 33 For example, see G. A. S., 'Supremacy of honest convictions over all other considerations', *Journal of Zoophily*, 1901, 10: 66.
- 34 *Twenty-first Annual Report of the American Humane Association*, 1897: 38-9.
- 35 For criticism of Sanarelli's research, see W. Osler, *The Principles and Practice of Medicine*, New York: D. Appleton, 3rd edn, 1898: 183.
- 36 *Human Vivisection: a statement and an inquiry*, 2nd edn, American Humane Association, 1899.
- 37 See *Human Vivisection: foundlings cheaper than animals*, Washington, DC, 1901. G. L. Fitch, 'The etiology of leprosy', *New York Medical*

- Record*, 1892, 42: 293-303. Fitch took the fact that the girls did not develop syphilis as proof of his theory.
- 38 See G. M. Searle, 'Murder in the name of science: experiments on children', *Catholic World*, 1900, 70: 493-504. One surprising omission in the discussion of child vivisection was the introduction of diphtheria antitoxin. In claims about the inutility of animal experimentation, the antitoxin was cited as another example of inflated claims by defenders of medical research. See A. Leffingwell, *The Vivisection Question*, Chicago: Vivisection Reform Society, 1907: 180-2.
- 39 Benison, Barger, and Wolfe, *Walter B. Cannon*: 177-9.
- 40 D. Belais, 'Vivisection animal and human', *Cosmopolitan*, 1910, 49: 267-73; for White, see 'Still more barbarity', *Journal of Zoophily*, 1910, 19: 44.
- 41 W. W. Keen, 'The influence of anti-vivisection on character', *Boston Medical and Surgical Journal*, 1912, 166: 651-8, 687-94. This appeared in the American Medical Association's Defense of Research Series, Pamphlet XXIV.
- 42 A. H. Wentworth to W. W. Keen, 22 June 1911, William Williams Keen Papers, Library, College of Physicians of Philadelphia. For Bayliss's victory in the Brown Dog libel suit, see 'An anti-vivisection leader', *Journal of the American Medical Association*, 1910, 54: 540; C. Lansbury, *The Old Brown Dog: women, workers, and vivisection in Edwardian England*, Madison: University of Wisconsin, 1985: 10-12.
- 43 W. J. Shultz, *The Humane Movement in the United States, 1910-1922*, New York: AMS Press, 1924: 154-7, mistakenly cites these cases as the first attention paid to human vivisection.
- 44 S. M. Hamill, H. C. Carpenter and T. A. Cope, 'A Comparison of the von Pirquet, Calmette, and Moro tuberculin tests and their diagnostic value', *Archives of Internal Medicine*, 1908, 2: 405-47.
- 45 Hamill, 'Comparison': 419.
- 46 Hamill, 'Comparison': 425.
- 47 *Tuberculin Tests on Human Beings*, Philadelphia, n.d.; *Vivisection - A Menace to Hospital Patients*, New York, n.d.; and *Vivisection Clamor for Human Beings to Vivisection*, New York, n.d.
- 48 See photograph; Belais, 'Vivisection': 273.
- 49 Belais, 'Vivisection': 269.
- 50 L. E. Holt, 'A report upon one thousand tuberculin tests in young children', *Archives of Pediatrics*, 1909, 26: 1-26. For Holt's role in American pediatrics, see K. Jones, 'Sentiment and science: the late nineteenth century pediatrician as mother's adviser', *Journal of Social History*, 1983, 17: 79-96, and R. L. Duffus, and L. E. Holt, jun., *L. Emmett Holt: Pioneer of a Children's Century*, New York: D. Appleton-Century, 1940: especially 163-7.
- 51 *Vivisection - A Menace to Hospital Patients*: 3.
- 52 L. Hamman and S. Wolman reported: 'It is important that these tuberculin tests should be tried on as varied a material as possible', in 'The cutaneous and conjunctival tuberculin tests in the diagnosis of pulmonary tuberculosis', *Archives of Internal Medicine*, 1909, 3:

- 307-49, on 307. For staff co-operation in allowing use of 'material', see G. S. Derby and T. H. Ayer, 'A clinical investigation on the relationship of tuberculosis to certain diseases of the eye', *Journal of the American Medical Association*, 1910, 54: 1762.
- 53 *Tuberculin Tests on Human Beings*, Philadelphia, n.d. The pamphlet does include some misleading quotations from research reports; for example, reference to the 'Report of the committee for the study of the relation of tuberculosis to diseases of the eye' seemed to confirm professional consensus about the undesirability of the Calmette test; however, the author of the report did not agree. See W. H. Wilder, 'Report of the committee for the study of the relation of tuberculosis to diseases of the eye', *Journal of the American Medical Association*, 1910, 55: 21-4.
- 54 See S. E. Lederer, 'Hideyo Noguchi's luetin experiment and the anti-vivisectionists', *Isis*, 1985, 76: 31-48.
- 55 Noguchi described some reddening of the injection site, and in a few children, slight fever, malaise, diarrhoea and loss of appetite. Noguchi, 'A cutaneous reaction in syphilis', *Journal of Experimental Medicine*, 1911, 14: 557-68.
- 56 R. M. Pearce, *The Charge of 'Human Vivisection' as presented in Anti-vivisection Literature*, Chicago: American Medical Association, 1914.
- 57 According to Hamill's biographer, the sisters were seeking to redirect attention from their own culpability for the high mortality rate in the asylum; see J. Stokes, jun., 'Samuel McClintock Hamill', in B. S. Veeder (ed.) *Pediatric Profiles*, St Louis: Mosby, 1957: 96-7. In 1911 Hamill reported the use of children at the Baptist Orphanage of Philadelphia; see S. Hamill and K. D. Blackfan, 'Frequency and significance of albumin in the urines of normal children', *AJDC*, 1911, 1: 140.
- 58 Pearce, *The Charge of 'Human Vivisection'*: 20.
- 59 Stickler inoculated children with foot-and-mouth disease and then exposed them to scarlet fever; see J. W. Stickler, 'Foot and mouth disease as it affects man and animals', *Medical Record*, 1887, 32: 725-32.
- 60 Pearce, *The Charge of 'Human Vivisection'*: 6-7.
- 61 For loss of public credibility, see K. L. Buell, 'A campaign of lies', *Harper's Weekly*, 1914, 58: 15; 'Another anti-vivisection fiasco', *Journal of the American Medical Association*, 1914, 62: 1025.
- 62 S. Flexner to L. E. Holt, 2 April 1914, Simon Flexner Papers, American Philosophical Society Library.
- 63 For similar reservations about opening up the discussion on human experimentation in 1899, see Benison, Barger, and Wolfe, *Walter B. Cannon*: 176-8.
- 64 See 'Defends tests on babies', *New York Evening Post*, 10 April 1914; 'Anti-vivisection', *Journal of Zoophily*, 1914, 23: 92-3.
- 65 'Report of the committee on the protection of medical research', *Journal of the American Medical Association*, 1914, 63: 94.
- 66 See plate 5 advertisement, *American Journal of Public Health*, 1914, 4: 2. W. B. Cannon to H. James, Jun. 19 October 1914; James to

- Cannon, 21 October 1914, Rockefeller University Archives, Record Group 600-1, Box 6, Folder 2. For anti-vivisection comment on the Lederle advertisement, see 'A new use for children', *Open Door*, January 1914: 11.
- 67 For example, a law that would require an experimenter to obtain the 'intelligent written consent' of the subject except in cases of individual benefit, and expressly outlaw experiments on children under the age of fifteen, the feeble-minded and the pregnant, was introduced in the Illinois legislature in 1905 'not in the hope of securing its passage, but of furnishing the occasion for enlightening the public'; see S. R. Taber, 'Shall vivisection be restricted?', reprinted from the *Chicago Record-Herald*, 12 May 1905, Chicago.
- 68 As late as 1926, the New England Anti-Vivisection Society recited the case of Mary Rafferty, who had electrodes inserted into her brain in 1874; see J. P. Morgan, 'The first reported case of electrical stimulation of the human brain', *Journal of the History of Medicine*, 1982, 37: 51-64.
- 69 For von Ruck, see 'A practical method of prophylactic immunization against tuberculosis', *Journal of the American Medical Association*, 1912, 58: 1504-7; reference to using gastric balloons in newborn infants, in A. J. Carlson, *The Control of Hunger in Health and Disease*, Chicago: University of Chicago, 1916; in K. S. Nicholson, 'Anti-vivisection notes', *Journal of Zoophily*, 1917, 26: 187-8; for producing molluscum contagiosum in a boy and girl at St Vincent's in 1908, see F. C. Knowles, 'Molluscum contagiosum: report of an institutional epidemic of fifty-nine cases', *Journal of the American Medical Association*, 1909, 53: 671-3, and for whooping cough, see 'Anti-vivisection notes', *Journal of Zoophily*, 1913, 22: 11.
- 70 Survey of the *American Journal of Diseases of Children*, which began publication in 1911. Identifying cases of non-therapeutic experimentation can be difficult, especially in the case of sick children. When, for example, is an experimental manipulation seen as directly related to diagnosis and treatment of the child? In my survey, I excluded reports of individual cases and studies involving routine tests of blood and urine in which no manipulation of the children was made.
- 71 F. G. Benedict and F. Talbot, 'Some fundamental principles in studying infant metabolism', *AJDC*, 1912, 4: 129-36.
- 72 In fifteen papers physicians explicitly referred to patients as material. For example, see E. Long and E. W. Caldwell, 'Some investigations concerning the relationship between carpal ossification and physical and mental development', *AJDC*, 1911, 1: 113.
- 73 For discussion of the condescension and ambivalence that marked relationships between paediatric patients and their physicians, see Rosenberg, *The Care of Strangers*: 303-4.
- 74 H. Wilcox, 'The diagnosis of infantile tetany', *AJDC*, 1911, 1: 393-416 (quote appears on 399). In one case, a urine collection tube on the penis of an infant caused swelling and was removed before the end of the observation period. See O. Schloss and J. L. Crawford, 'The

- metabolism of nitrogen, phosphorus and the purin substances in the newborn', *AJDC*, 1911, 1: 203-30.
- 75 G. Pisek and L. T. Lewald X-rayed both normal and sick infants from 2 days old to 20 months; 'The further study of the anatomy and physiology of the infant stomach based on serial roentgenograms', *Transactions of the American Pediatric Society*, 1913, 25: 150-65.
- 76 A. W. Bosworth, H. I. Bowditch and B. H. Ragle, 'Whey in infant feeding', *AJDC*, 1915, 9: 124.
- 77 See Karl von Ruck and H. J. Achard, 'Specific resistance in tuberculosis', *Pediatrics* (NY), 1913, 25: 742-56.
- 78 G. B. Webb, 'Studies in tuberculosis', *Bulletin of the Johns Hopkins Hospital*, 1912, 23: 233.
- 79 J. H. Young, 'The science and morals of metabolism: catsup and benzoate of soda', *Journal of the History of Medicine*, 1968, 23: 86-104.
- 80 C. G. Grulee and W. H. Buhlig, 'Investigation of the action of sodium benzoate in artificially-fed infants', *Archives of Pediatrics*, 1911, 28: 849-67. L. E. Holt also did studies of infants; see Young, 'The science and morals of metabolism': 102.
- 81 The observations involved stomach tracings after the introduction of balloons into thirty normal breast-fed infants; see A. J. Carlson, *The Control of Hunger in Health and Disease*, Chicago: University of Chicago Press, 1916: 40, 120.
- 82 After his experiments on scarlet fever failed, J. W. Stickler committed suicide "obsessed" with the idea that he was immortalizing his name and would deserve the gratitude of future generations'. See Pearce, *The Charge of Human Vivisection*: 6.
- 83 For Hess, see H. J. Gerstenberger, 'Obituaries: Alfred Fabian Hess, MD', *AJDC*, 1934, 47: 635-9.
- 84 A. F. Hess, 'The use of a series of vaccines in the prophylaxis and treatment of an epidemic of pertussis', *Journal of the American Medical Association*, 1914, 63: 1007.
- 85 A. F. Hess, 'A duodenal tube for infants', *AJDC*, 1911, 1: 365. See A. F. Hess, 'The gastric secretion of infants at birth', *AJDC*, 1913, 6: 264-76.
- 86 See D. P. Serwer, 'The rise of radiation protection: science, medicine and technology in society, 1896-1935', Ph.D. thesis, Princeton University, 1977.
- 87 K. Bercovici, 'Orphans as guinea pigs', *Nation*, 1921, 112: 911-13.
- 88 A. F. Hess and M. Fish, 'Infantile scurvy: the blood, the blood vessels, and the diet', *AJDC*, 1914, 8: 386-405.
- 89 For the work on rickets, see A. F. Hess and L. J. Unger, 'Dieteries of infants in relation to the development of rickets', *Proceedings of the Society for Experimental Biology and Medicine*, 1919-20, 17: 220-1.
- 90 Bercovici, 'Orphans as guinea pigs': 913.