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Contributors

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The History of Pediatrics and Its Relation to Other Sciences and Arts

By
A. JACOBI, M.D., LL.D.
of New York City

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The Foundations and Aims of Modern Pediatrics

By
DR. THEODORE VON ESCHERICH
of Vienna, Austria

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THE HISTORY OF PEDIATRICS AND ITS RELATION TO OTHER SCIENCES AND ARTS.¹

BY

A. JACOBI, M.D., LL.D.,

of New York City.

Professor Emeritus, Columbia University, New York.

The most human of all the gods ever created by the fancy or the religious cravings of mortal men was Phœbus Apollo. It was he that gave its daily light to the wakening world, flattered the senses of the select with music, filled the songs of the bards and the hearts of their hearers with the rhythm and wonders of poetry, that inspired and reveled with the muses of the Parnassus, cheered the world with the artistic creations of the fertile brains and skilful hands of a Zeuxis and Phidias—he, always he, that inflicted and healed warriors' wounds and sent and cured deadly diseases.

In the imagination of a warm-hearted and unsophisticated people it took a god to embrace and bestow all that is most beneficent and sublime—physical, moral, and mental light and warmth; the sun, the arts, poetry, and the most human and humane of all sciences and arts, namely, medicine.

Ancient gods no longer direct or control our thoughts, feelings, and enjoyments, either physical or intellectual. The kinship and correlation of hypotheses and studies, experience and knowledge are in the keeping of the philosophical mind of man, who is both their creator and beneficiary. To demonstrate this rational affinity of all the sciences and arts, some far-seeing men planned this great Congress. The new departure—in the arrangement for it—should be an example to future gen-

¹ Read before the Congress of Arts and Science, St. Louis, Mo., September 21, 1904.

only in those schools which are forming part of universities and are no longer proprietary establishments, a few now occupy the honored position of full professors; in a very few the professor of pediatrics is a full member of the "faculty."

In the English Colonies of America the earliest treatise on a medical, in part pediatric subject was a broadside, 12 inches by 17. It was written by the Rev. Thomas Thacher, and bears the date January 21, 1677-8. It was printed and sold by John Foster, of Boston. The title is "a brief rule to guide the common people of New England how to order themselves and theirs in the Small-Pocks, or measles." A second edition was printed in 1702.

Before and about the same time in which American pediatrics received its first recognition at the hands of the New York Medical College, European literature furnished a new and brilliant special literature. France which almost exclusively held up the flag of scientific medicine during the first forty years of the eighteenth century, furnished in C. Billard's *Traité des maladies des enfants nouveau-nés*, 1828, and in Rilliet's and Barthez's *Traité clinique et pratique des maladies des enfants*, 1838-43, standard works which were examples of painstaking research and fertile observation. England, which produced in 1801 I. Cheyne's *Essays on the diseases of children*, gave birth to Charles West's classical lectures on the diseases of infants and children in 1848, and F. Churchill's treatise in 1850.

The German language furnished a master-work in Bednar's *die Krankheiten der Neugeborenen und Säuglinge*, 1850-53. A. Vogel and C. Gerhardt, both general clinical teachers, gave each a textbook in 1860, Henoch in 1861; and Steffen in 1865-70, published a series of classical essays.

The number of men interested in the study and teaching of pediatrics grew in proportion to the researches and wants of the profession at large. That is why three large and influential cyclopedias, the works of many authors, found a ready market, namely, C. Gerhardt's *Handbuch der Kinder-Krankheiten*, 1877-93; John M. Keating's *Cyclopedia of the Diseases of Children, Medical and Surgical*, 1889-90, and I. Grancher's and I. Comby's *Traité des Maladies des Enfants*, in five volumes, the second edition of which is being printed this very year.

The collective and periodic literature of pediatrics

began at a comparatively early time. There was a period towards the end of the eighteenth century when the influence of Albrecht von Haller seemed to start a new life for German medical literature before it lost itself again in the intellectual darkness of Schelling's natural philosophy, from which it took all the powers of French enthusiasm and research, and the epoch-making labors of Skoda, Rokitansky, and finally Virchow, to resuscitate it. About that early time of Haller, there appeared in Liegnitz, 1793, a collection of interesting treatises on some important diseases of children (*Sammlung interressanter Abhandlungen über etliche wichtige Kinderkrankheiten*). France followed in 1811 with a collection bearing the title "*La Clinique des Hôpitaux des enfants, et revue retrospective médico-chirurgicale et hygiénique. Publiées sous les auspices et par les médecins et chirurgiens des hôpitaux consacrés aux maladies des enfants.*" Next in order are five volumes of Franz Joseph von Metzler's *Sammlung auserlesener Abhandlungen über Kinderkrankheiten*, 1833-36. Twelve fascicles under the title *Analekten über Kinderkrankheiten oder Sammlung ausgewählter Abhandlungen über die Krankheiten des Kindlichen Alters*; *la clinique des Hôpitaux des enfants*, Redacteur en chef Vanier, Paris, 1841; and I. Behrend and A. Hildebrandt, *Journal für Kinderkrankheiten*, which appeared regularly from 1843 to 1872. It gave way to the *Jahrbuch für Kinderheilkunde*, which appeared in quick and regular succession from 1858 to the present time. Three series of Austrian Journals between 1855 and 1876 consisted of a dozen volumes only. They contain among other important contributions the very valuable essays of Ritter von Rittershayn, who deserved more recognition during his life and more credit after his death, for his honesty, industry and originality, than he attained.

Special pediatric journals have multiplied since. The United States has two, France three, Germany five, Italy two, Spain one. As long as they are taken by the profession we should not speak of over-production. I attribute their existence to the general conviction that there is no greater need than of the distribution of knowledge of the prevention and cure of the diseases of the young. The literature of pediatrics seems to prove it. Not 7,000, as before 1850, not even 70,000 titles of books, pamphlets, and magazine articles exhaust the number.

Pediatric societies have increased at the same rate.

The American Medical Association and the British Medical Association founded each a section 25 years ago, the New York Academy of Medicine, in 1886. The American Pediatric Society was founded in 1889, the *Gesellschaft für Kinderheilkunde* connected with the German *Gesellschaft der ärzte und Naturforscher* in 1883, the English Society for the Study of Disease in Children, in 1900. There are pediatric societies in Philadelphia, in the State of Ohio, in Paris, Kiew, St. Petersburg, and many places, all of them engaged in earnest work which is exhibited in volumes of their own or in the magazines of the profession. If we add the annual reports of hundreds of public institutions, which are so numerous indeed that a large volume of S. Hügel, "*Beschreibung sämtlicher Kinderheilanstalten in Europa*," was required as early as 1848 to enumerate them; and an enormous number of text-books of masters, and of such as are anxious to become so, and monographs, and essays, and lectures, and notes preliminary and otherwise, which fill the magazines that most of us take or see, and some of us read—we may form an idea to what extent a topic formerly neglected has taken hold of the conscience and the imagination of the medical public.

Before 1769 there was no institution specially provided for sick children. They were admitted now and then to foundling institutions and general hospitals. In that year Dr. G. Armstrong established a dispensary in London, which was carried on until he died. A similar institution was founded in Vienna by Dr. Marstaller, in 1784. Goelis took charge of it in 1794, L. Politzer developed it, and it is still in existence. Before the French Republic was strangled, it founded the first and largest child's hospital in Europe, the *Hôpital des Enfants malades*, in 1802. The Nicolai Hospital was established in St. Petersburg, in 1834, by Dr. Friedburg; the St. Anne's Child's Hospital, in Vienna, 1837, by Dr. Ludwig Mauthner; and the Poor Children's Hospital, of Buda Pesth, in 1839, by Dr. Schöpf Merei, who afterwards founded and directed the Child's Hospital of Manchester, England.

Since that time the increasing interest in the diseases of children on the part of humanitarians and of physicians and teachers has multiplied children's hospitals. Most of them are small, but they are numerous enough both to exhibit and disseminate the sense of responsibility to the sick and to the necessities of teaching. The United States has been the last country to participate in

these endeavors. The mostly proprietary medical schools did not find pediatric teaching to their advantage, and it took the hearts and purses of the public a long time to be opened. The waves of humanitarianism, sometimes directed by a church, and the demands of science have finally overcome previous indolence. There are many general hospitals that gradually opened special children's wards. You find pediatric hospitals in some of the larger cities—New York, Boston, Philadelphia, Albany, St. Louis, and others. It has so happened, however, that real specialties have appealed more to the general sympathy than pediatrics. That is why the number of beds in orthopedic and other special hospitals are mostly favored. Practical teaching has not been extensive. Children's hospitals that should be used for that purpose, and that are directly connected with a medical school, are but few. It has taken the medical faculties, even of Universities, too much time to appreciate the necessity of special and well-regulated bedside teaching. In some instances lay trustees, guided by their medical advisers, have opened their wards before faculties have consented to open their eyes. At the present time, however, there is hardly a great medical school that does not give amphitheatre or bedside instruction, either in a children's ward of a general hospital or in a special children's or babies' hospital. To a certain extent the teaching of pediatrics in a general hospital has its great advantages. It is not a specialty like that of a special sense or a tissue. For the purpose of study it had to be segregated, but it will never be torn asunder from general medicine. Vogel and Gerhardt were both general clinicians.

The comparative anatomy and physiology, hygiene, etiology, and nosology of pediatrics have been discussed before you by one of the most prominent pediatricists of our era. It will be my privilege to explain, as far as time will permit, its relation to general medicine, to embryology and teratology, obstetrics, hygiene, and private and public sanitation, to therapeutics both pharmacal and operative, and to the specialties of otology, ophthalmology, dermatology, and the motor system, to pedagogy, to neurology and psychiatry, forensic medicine and criminology, and to social politics.

Infancy and childhood do not begin with the day of birth. From conception to the termination of foetal life evolution is gradual. The result of the conception depends on parents and ancestors. Nowhere are the

laws of heredity more perceptible than in the structure and nature of the child. Physical properties, virtues and sins, and tendencies to disease may not stop even with the third or fourth generation. Hamburger and Osler trace an angio-neurosis through six generations, the first case in the series being observed by Benjamin Rush. In many instances still-births, early diseases, atrophy, and undue mortality of the young depend on ante natal happenings. The condition and diet of the mother influences her offspring. The danger of a contracted pelvis, and the necessity of premature delivery may be obviated by the restriction of the diet, or even by appropriate (thyroid and other) medication of the pregnant woman. Experience and experiment tell the same story. The continued practice of preventing conception causes endometritis. Alcoholism causes chronic placentitis, premature confinement, or still-birth. So does chronic phosphorus and lead poisoning. Fortunately, however, the usual medication resorted to during labor is rarely dangerous, for even morphine or ergot doses given to the parturient woman on proper indications affect the newly-born rarely, and chloroform anesthesia almost never.

Scanty amniotic liquor, by the prevention of free intra-uterine excursions, may cause club-foot; or close contact of the surfaces of the embryo and the membranes give rise to adhesions of the placenta and the head, to filaments and bands whose pressure or traction produces grooving or amputation of limbs, cohesion of toes or fingers, umbilical, meningeal, encephalic, or spinal hernia; not in extra-uterine pregnancy only, where such occurrences are very frequent. Even the majority of harelips and fissured palates have that origin. Arrests of development and foetal inflammation are the headings under which most of the anomalies of the newly-born may be subsumed; congenital diseases of the ear and of the heart may result from either cause or from both. Obstructions of the intestines, the rare closures of the œsophagus, the ureter, and the urethra, with hydro-nephrosis and cystic degeneration of the kidneys are probably more due to excessive cell proliferation in the minute original grooves than to inflammation.

The insufficient closures of normal embryonic fissures or grooves explains many cases of spina bifida, many of encephalocele, most of the split lips and palates, all of porencephalus, bifid uvula and epiglottis, pharyngeal and thyroglossal fistulæ, the communications between

the intestinal and uro-genital tracts, and the persistency and patency of the urachus.¹

Heredity need not show itself in the production of a fully developed disease. It exhibits itself normally either in equality or resemblances, either total or partial, of the body, or some one or more of its external or internal organs. In this way it may affect the nervous, the muscular, the osseous, or other tissues. That is why dystrophies in different forms, obesity, achondroplasia, hyperplasia, or atrophy may be directly inherited, while in other cases the disposition to degeneration only is transmitted.

Hereditary degeneracy is often caused by social influences. The immoral conditions created by our financial system make women select not the strong and hearty and the young husband, but the rich and old, with the result of having less, and less vigorous, children. Certain professions, the vocations of soldiers and mariners, and subordinate positions of employees in general, enforce complete or approximative celibacy, with the same result. The nations that submit to the alleged necessity of keeping millions of men in standing armies, are threatened with a degenerated offspring, for not only do they keep the strongest men from timely marriages, but they increase prostitution and venereal diseases, with their dire consequences for men, women, and progeny. Wars lead to the same result in increased proportion, for tens and hundreds of thousands of the sound men are slain or crippled, or demoralized. Those who are inferior and unfit for physical exertions remain behind and procreate an inferior race; those who believe with Lord Rosebery that an empire is of but little use without an imperial race will always, in the interests of a wholesome civilization, object to the untutored enthusiasm which denounces the "weakling," and the "craven cowardice" of those who believe in the steady evolution of peace and harmony amongst men, and, in sympathy with the physical and moral health of the present and future generation, will prefer the cleanly and washed sportsman-

¹J. W. Ballantyne, in his manual of antenatal Pathology and Hygiene, 1902, has a separate chapter on the relations of antenatal pathology to other branches of study, to general pathology, to the biological sciences, such as anatomy, embryology, physiology, botany, and zoology, and to the medical, including obstetrics, public health, pediatrics, medicine, psychology, dermatology, surgery, orthopedics and medical jurisprudence, finally to gynæcology and neo-natal pathology

ship of an educated youth to that of the mud-streaked and blood-stained manhunter.

A great many diseased conditions cannot be thoroughly understood unless they be studied in the evolving being. Tumors are rarely inherited, but many of them are observed in early life. Lymphoma, sarcoma, also lipoma and carcinoma, and cystic degeneration, are observed at birth, or within a short time after, and seem to favor Cohnheim's theory, according to which many owe their origin to the persistence in an abnormal location of embryonic cells. This theory does not exclude the fact that congenital tumors may remain dormant for years or decades and not destroy the young.

So much on some points connected with *embryology* and *teratology*. The connection with *obstetrical practice* is equally intimate. Three percent of all the mature living foetuses are not born into postnatal life this very day. To reduce the mortality even to that figure, it has taken much increase of knowledge and improvement in the art of obstetrics to such an extent that it has become possible by Cesarean section not only to save the foetus of a living, but also of a dead mother, for the foetus in her may survive the dying woman.

But after all, many a baby would be better off, and the world also, if it had died during labor. There are those, and not a few, who are born asphyxiated on account of interrupted circulation, compression of the impacted head, or meningeal or encephalic hemorrhage, which destroys many that die in the first week of life. Those who are not so taken away may live as the result of protracted asphyxia only to be paralytic, idiotic, or epileptic. Many times in a long life have I urged upon the practitioner to remember that every second added to the duration of asphyxia adds to the dangers either to life or to an impaired human existence. Besides fractures, facial or brachial paralysis, cephalhæmatoma and hæmatoma of the sterno-cleido mastoid muscle, gonorrheal ophthalmia, with its dangers to sight and even life, may be daily occurrences in an obstetrician's life. All such cases prove the insufficiency of knowledge without art, or of art without knowledge, and the grave responsibility of the practical obstetrician. To lose a newly-born by death causes at least dire bereavement; to cripple his future is not rarely criminal negligence.

Within a few days after birth the obstetrician or the pediatricist has the opportunity of observing all sorts of microbic infections, from tetanus to hemorrhages or

gangrene, and the intense forms of syphilis. Not an uncommon disease of the newly-born and the very young is nephritis. It is the consequence, in many cases, of what appears to be a common jaundice, or of uric acid infarction, which is the natural result of the sudden change of metabolism. The diverticula of the colon, as described by Hirschsprung and Osler, and what nearly 40 years ago were characterized as congenital constipation, which depends on the exaggeration of the normally excessive length of the sigmoid flexure, belong to the same class. Their dangers may be avoided when they are understood. Of the infectious diseases of the embryo and the foetus, it is principally syphilis that should be considered; amongst the acute forms variola and typhoid are relatively rare.

What I have been permitted to say is enough to prove the intimate interdependence and connection between pediatrics and the diseases of the foetus with embryology and teratology, obstetrics, and some parts at least, of social economics.

After birth there are anomalies and diseases which are encountered in the infant and child only. There are also, common to all ages, though mostly found in children, such as exhibit a symptomatology and course peculiar to them. The first class, besides those which are seen in the newly-born, is made up mostly of developmental diseases—scrofula, rachitis, chlorosis. The actual or alleged ailments connected with dentition, most forms of stomatitis, Bednar's so called aphthae, the ulceration of epithelial pearls along the raphe, amygdalitis, pharyngitis, adenoid proliferations, latero- and retro-pharyngeal abscesses belong here. Infectious diseases, such as variola, diphtheria, scarlatina, measles, pertussis, and tuberculosis of the glands, bones, joints, and peritoneum have been most successfully studied by pediatricists or those clinicians who paid principal attention to pedology. Meissner prints the titles of more than 200 actual monographs on scarlet fever published in Europe before 1848. Pleurisy and pneumonia of the young have their own symptomatology. Empyema is more frequent and requires much more operative interference. Tracheotomy and intubation are mostly required by the young, both on account of their liability to cedema of the larynx and to diphtheria, and of the narrowness of the larynx. Of invagination, 25% occur under one year, 53% under 10. Appendicitis, sometimes hereditary and a family disease, would long ago have been recognized as a frequent occurrence in the young if

it had not been for the difficulty, mainly encountered in the young, and sometimes impossibility of its diagnosis. That is what we have been taught by Hawkins and by Treves, and lately by McCosh. Operations on glandular abscesses, osteotomies, and other operations on the bones and joints, particularly in tuberculosis, and on malformations, such as have been mentioned, require the skilful hand of the operating physician in a great many instances. Omphalocele, exstrophy of the bladder, undescended testicle, spermatic hydrocele, multiple exostoses, imperforate rectum, atresia of the vagina, or an occasional case of stenosed pylorus, belong to that class, some requiring immediate operation, some permitting of delay. It is principally infancy that demands removals of angioma, which are almost all successful, and of hygroma, mostly unsuccessful, mainly when situated on the neck and resulting from obstruction of the thoracic duct sometimes connected with thrombosis of the jugular vein. Childhood requires correction of kyphosis and scoliosis, and operations for adenoids and hypertrophied tonsils, and furnishes the opportunities for lumbar puncture and laparotomy in tubercular peritonitis; also supra-pubic cystotomy, and mastoid operations. That gum-lancing is no operation indicated or permissible in either the young or adult, and not any more so in the former than in the latter, is easily understood by those who acknowledge its necessity only in the presence of a morbid condition of the gums or teeth, and not when the physiological process of dentition exhibit no anomaly. It scarcely ever does. Altogether operating specialists would work and know very much less if a large majority of the cases were not entrusted to them by the pediatricist, who recognizes the principle that those who are best fitted to perform it should be trusted with important medical work. So well is the seriousness and difficulty of operative procedures, as connected with diseases of children, recognized by experts, that 1,500 pages of Gerhardt's handbook are dedicated to external pathology and operations, and that special works, besides many monographs by hundreds of authors, have been written by such masters as Guersant, Forster, Bryant, Giraldès, Holmes, St. Germain, Karewski, Lannelongue, Kirmisson, and Broca.

Ear specialists recognize the fact that otology is mostly a specialty of the young. The newly-born exhibit changes in the middle ear which are variously attributed to the presence of epithelial detritus, to the aspiration of

foreign material, or to an œdema *ex vacuo* occasioned by the separation of formerly adjacent mucous surfaces. Pus is found in the middle ear of 75% of the still-born or of dead nurslings. It contains meconium, lanugo, and vernix. Aschoff¹ examined 50 stillborn, or such as had lived less than two hours; 28 of them had pus in the middle ears (55%). He also examined 35 infants that had lived longer than two hours; 24 had pus (70%). Evidently the latter class had been exposed to a microbic invasion. The diagnosis in the living infant is very difficult, mostly impossible, on account of the large size of the Eustachian tube, which after having admitted the infection, allows the pus to escape into the pharynx and the rest of the alimentary canal. Many of the newlyborn that die with unexplained fevers perish from the septic material, or its toxins, absorbed in the middle ear or the intestines. Nor are older children exempt. Gelpert (Jahrb. f. Kind., xlv, 1897) found a latent otitis media in 75% of all the inmates of the Children's Hospitals. Both latent and known otitis is often connected with pneumonia, or with pneumonia and enteritis. In individual cases it may be difficult to decide which of the two or three is the primary, which the secondary affection.

The great vascularity of the middle ear, but still more the accessibility of the funnel-like Eustachian tube in the infant, renders otitis media very frequent. Schwartze's assertion that otitis media furnishes 22% of all ear cases in general or special practice is surely correct. Besides, difficult hearing is very frequent in the young, a fact of the greatest import to pedagogy. As early as 1886 Bezold found that of 1,900 school children 25% had only one-third, and 11% of the others only one-fifth of normal hearing. The frequent affections of the nose and pharynx in the young explain these facts and exhibit the possibilities of preservation. Finally, the immature condition of the mastoid process and of the floor of the external canal is best appreciated by the practitioner, general or special, who deals with their abscesses.

Whether deafmutism is the result of consanguineous marriage cannot be definitely asserted. It is not often hereditary, quite often it appears to be the result of family alcoholism, it sometimes depends on arrest of development and foetal inflammation, but is more frequently an

¹ Aschoff, z. f. Ohrenh. Vol. xxxi.

acquired condition. Not rarely children are affected after they have been able to speak. The majority of cases are caused by cerebral or cerebro-spinal inflammation. According to Biedert, 55% are of that class, 28% are caused by infectious diseases (cerebro-spinal meningitis, scarlatina, typhoid fever, diphtheria, also variola and measles), 3.3% by injuries, and only 2.5% are original ear affections. Thus many of the congenital cases, and most of the acquired, are preventable. More and more will our deaf-mute institutions avail themselves of this knowledge, and will learn how to teach their children not only how to read and write, but also how to hear.

Not to the same, but to a great extent, pediatrics and *ophthalmology* join hands. Infectious diseases, such as diphtheria, affect the conjunctiva and sometimes the cornea. Syphilis of the cornea, with or without chronic iritis, is the form of parenchymatous or diffuse keratitis. A frequent tumor in the eye of the young is glioma, and frequent symptomatic anomalies are strabismus and nystagmus—both of them the results of a great many and various external or internal causes, with sometimes difficult diagnoses.

The connection of pedology with *dermatology* is more than skin deep; some of the most interesting problems of the latter must be studied on antenatal and postnatal lines. The congenital absence of small or large parts of the surface is probably due to amniotic adhesions; seborrhea and the mild form of lichen, also the furunculosis of infant cachexia and atheroma, to the rapid development, in the second half of intra-uterine life, of the sebaceous follicles; ichthyosis, to the same and to a hypertrophy of the epidermis and the papillæ of the corium, sometimes with dilatation of their blood-vessels and with sclerosis of the connective tissue. Congenital anomalies, such as lipoma, sarcoma, nævus pigmentosus, open all the questions of the embryonal origin of neoplasms; and the eruptions on the infant surface uncloseto the specialist the subject of infectious diseases. We recognize in the pemphigus of the palms and soles syphilis; in herpes, gangrene, in what I have described as chronic neurotic pemphigus, the irritable nervous system; in eczema, constitutional disturbances of the nutrition; in erythema, local irritation or intestinal auto-infection; in isolated or multiple forms ranging between hyperæmia and exudation, the effect of local irritation or the acute or chronic influence of drugs. A dermatol-

ogist who knows no embryology or pedology, a paediatrist who knows no dermatology, is anything but a competent and trustworthy medical practitioner.

The diseases of the *muscles* interest the paediatrist, the surgical specialist, the orthopædist, the neurologist, to an equal extent. Many forms of myositis are of infectious origin. Amongst the special forms of muscular atrophy it is the hereditary variety which concerns the first. The spinal neuritic atrophy the myogenous paediatrist, progressive dystrophy, including the so-called pseudo-hypertrophy, Thomson's congenital myotonia, and (atrophy) defects of muscles—mainly the pectoral, but also the trapezius, quadriceps, and others—no matter whether they are primary or myogenous (this probably always when there is a complication with progressive dystrophy), are of special interest. I need not do more than mention torticollis in order to prove that neither the special paediatrist nor the special orthopædist, nor the general surgeon can raise the claim of ownership.

The relations of paediatrics to *forensic medicine* are very close. Nothing is more apt to demonstrate this than the immense literature in every language on infanticide and all the questions of physiology, physics, and chemistry connected with that subject. The monographs and magazine essays of the last two centuries written on the value or the fallacy of the lung test in the dead newly-born would fill a small library. Much attention has been paid by physicians and by forensic authors to lesions and fractures of the newly-born head, and to anomalies of the female pelvis causing them. Apparent death of the newly-born and the causes of sudden death in all periods of life have been studied to such an extent as to render negative results of police investigation and of autopsy reports less numerous from year to year. Most sudden deaths receiving the attention of the authorities occur in the young. There were (Wm. Wynn Westcott in Brit. M. J., Nov. 7, 1903) in England and Wales during ten years 15,009 overlain infants; in 1900, 1,774. In Liverpool, out of 960 inquests there were 143 on babies that had died of such suffocation by accident or malice aforethought; in London, in 1900, 615; in 1901, 511; in 1902, 588. In London they had annually 8,000 official inquests, one of 14 of which were on overlain infants. The etiology of sudden deaths would be far from complete, indeed the most difficult questions could not be solved except by the facilities furnished by the observations on the young. Foreign

bodies in the larynx, beans, shoe-buttons, and playthings generally, even ascarides (Bouchut), bones and pieces of meat aspirated during vomiting, acute œdema of the glottis, aspiration of a long uvula, or of the retracted tongue, the rupture of a pharyngeal abscess or of a suppurating lymphoid body into the trachea, a sudden swelling of the thymus in the narrow space between the manubrium and vertebral column, which at best measures only 2.2 cm., even a coryza in the narrow nose of a small infant filled or not with adenoids—are causes of sudden death.

The *nervous system* furnishes many such cases. It is true there is no longer a diffuse interstitial encephalitis, such as Jastrowitz would have it, nor is the hypertrophy of the brain by far so frequent as Hüttenbrenner taught, but there are sudden collapses and deaths by falls on the abdomen, by sudden strangulation of large herniæ and other shocks of the splanchnic nerve. There are sudden and unexplained deaths in unnoticed attacks of convulsions, in the first paralytic stage of laryngismus stridulus, in glottic spasms from whatever cause, in the paralysis—or, according to Escherich, laryngo-spasm—of what since Paltauf has been denominated status lymphaticus, in cerebral anemia, no matter whether it is the result of exhaustion or, as Charles West taught us 60 years ago, from the mere change of position of a pneumonic or otherwise sick baby, when suddenly raised from its bed. Or death may occur suddenly (a very frequent occurrence) in the heart failure of parenchymatous degeneration of the heart muscle as it occurs in and after diphtheria, influenza, and other infectious diseases, or in the acute sepsis of appendicitis and other intraperitoneal affections, whether recognized or not. For the absorbing power, even of the normal peritoneum, is enormous. Of a very acute infection, (“*infectio acutissima*,”) Wer-nich spoke as early as 1883.

In gastroenteritis, the terminating broncho-pneumonia may destroy life quite suddenly; there is a capillary bronchitis of the very young with no cry, no moan, and no cough, but with sudden death; there are in extreme atrophy, fatal emboli into the pulmonary, sometimes renal, more often cerebral arteries. There are the cases of uremic convulsions, sudden, with sudden death, which are often taken to be merely reflected or “providential,” because the frequency of acute nephritis in the newly-born and the infant, with its fever and its uremia, in spite of the publications of Martin and Ruge, Vir-

chow, Orth, Epstein, and my own, is not yet fully appreciated. That is so much the more deplorable as the diagnosis of nephritis at any age is readily made by the examination of the urine, which is so easy to obtain in the young. Other suddenly fatal conditions, such as the acute or chronic sepsis I mentioned before, often quite unsuspected, entering through the umbilicus, the intestine, or the middle ear, are quite frequent.

I have been careful not to mention any cause of death that may just as well be and has been studied in the adult: hemorrhages, the many forms of sepsis of later periods of life, poisons, such as carbolic acid and iodoform, intense cold or heat, insolation, etc., for it is my duty to exhibit the relation to forensic medicine of pediatrics only. Forensic medicine has to guard the interests of all. Nothing in all medicine is more difficult than the discovery of the cause of death. The best knowledge of the advanced practitioner, of the pathologist, of the chemist, of the bacteriologist, of the obstetrician, should be at the service of the people. Every European country understands that and acts on that knowledge. Our own Massachusetts has broken away from the coroner's institution, which was a fit authority for a backwoods municipality, but is so no longer for a cultured people of eighty millions. Now and then, even an expert, or a body of experts, does *not* succeed in discovering the cause of death. What shall we say of a system which *now and then does* discover the hidden cause of a sudden death? When the New York State Legislature half a year ago passed a bill abolishing the no longer competent office of coroner, our good cultured mayor, a gentleman and author, vetoed it for the reason that the new law was not perfect. It was not pronounced perfect by anybody, no law is nor ever was. That is why it appears he prefers something that always was and is, and always will be perfect, namely, the absurd incompetency and anachronism of the coroner's office. That is perfect. I have not hesitated to express myself strongly and positively, for I have been called upon to speak to you about the relation of pediatrics to other sciences and arts—politics included, than which there is no more profound practical and indispensable science and art. The greatest historical legislators understood that perfectly well, when they knew how to blend hygiene and religion with their social and political organization.

One of the greatest questions which concerns at the

same time the practical statesman, the humanitarian and the pediatricist, is that of the *excessive mortality* of the young. The Paris Academy of Medicine enumerated in its discussions of 1870 the following amongst its causes: Poverty and illness of the parents, the large number of illegitimate births, inability or unwillingness on the part of mothers to nurse their offspring, artificial feeding with improper material, the ignorance of the parents in regard to the proper food and hygiene, exposure, absence of medical aid, careless selection of nurses, lack of supervision of baby farms, general neglect and infanticide. *If there be anybody who is not quite certain about the relationship of sciences and arts, he will still be convinced of the correlation and cooperation of ignorance, indolence, viciousness and death, and shocked by the shortcomings of the human society to which we belong. Most of them should be avoided. Forty per cent of the mortality of infants that die before the end of the first year takes place in the first month. That is mostly preventable. A few years ago the mortality of the infants in the Mott Street barracks of New York City was 325 per mille. Much of it is attributable to faulty diet.*¹

Amongst those who believe in the omnipotence of chemical formulæ, there prevails the opinion that a baby deprived of mother's milk may just as readily be brought up on cow's milk; that is easily disproved. In Berlin they found that amongst the cows'-milk fed babies under a year the mortality was six times as great as amongst breast fed infants. Our own great cities gave us similar, or slightly smaller, proportions, until the excessive mortality of the very young was somewhat reduced by the care bestowed on the milk, introduced both into our palaces and tenements. Milk was examined for bacteria, cleanliness, and chemical reaction. It was sterilized, pasteurized, modified, cooled, but no cow's milk was ever under the laws of nature changed into human milk, and with better milk than the city of New York ever had, its infant mortality was greater this summer than it has been in many years.

That hundreds of thousands of the newly-born and

¹ Measures taken for the purpose of obtaining wholesome milk are not quite new. Regulations were given in Venice, 1599, for the sale of milk. Milk and its products of diseased animals were forbidden. The Paris municipality of 1792 enjoined the farmers to give their cows healthy food. Coloring and dilution of milk were strictly forbidden, and in 1792 they knew in France how to punish transgressors.

small infants perish every year on account of the absence of their natural food is a fact which is known and which should not exist. Why do we kill those babies or allow them to be killed? Why is it that they have no breast milk? A large number of women work in fields, still more in factories. That is why their infants cannot be nursed, are farmed out, fed artificially, with care or without it, and die. It is the misrule prevailing in our social conditions which compels them to withhold milk from the infant while they are working for what is called bread for themselves and their families. Many of these women, it is true, would not have been able to nurse their newly-born, for their own physical condition was always incompetent. The same may be said of women in all walks of life. Insufficient food, hard work, care, hereditary debility and disease, tuberculosis, alcoholism of the woman's own father, modified syphilis or nervous diseases in the family—aye, the inability of her own mother to nurse her babies, are ever so many causes why the mother's fountain should run dry. Statistics from large obstetrical institutions (Hegar) prove that only about 50 % of women are capable of nursing their offspring for merely a few weeks. In the presence of such facts what are we to say of the refusal of well-situated and physically competent women to nurse their infants? I do not speak of the "400," I mean the 400,000 who prefer their ease to their duty, their social functions to their maternal obligations, who hire strangers to nurse their babies, or worse yet, who make-believe they believe the claims of the infant food manufacturers, or are tempted by their own physicians to believe that cow's milk casein and cow's milk fat may be changed into woman's casein and fat, that chemistry is physiology, that the live stomach is like a dead laboratory bottle, that the warmth of the human bosom and that of a nursing flask are identical, and that cow's milk is like human milk when it carries the trademark "Certified," or "Modified." Physiological chemistry itself teaches that the phosphorus combinations in woman's milk in the shape of nuclein and lecithin are not contained in cow's milk, and that the large amounts of potassium and sodium salts contained in cow's milk are dead weights rather than nutrients, and particularly the large amount of calcium phosphate occurs in a chemical, not in a physiological, combination. But lately, by no means the first time, Schlossmann and Muro (*Münch. med. Woch.*, 1903, No. 14),

have again proved that the albuminoids of woman's and cow's milk are essentially different, both in their lactalbumin and the globulin, and Escherich and Marfan, that every milk has its own enzymes.

The quantitative and many of the qualitative differences of cows' and human milk have been known a long time. No addition or abstraction of salts, no addition of cow's fat will ever change one into the other. But it appears that every new doctor and every new author begins his own era. There is for most of modern writers no such thing as the history of medicine or of a specialty, or respect of fathers or brothers. In modern books and essays you meet with footnotes and quotations of the productions of yesterday that look so erudite, but also with the new discoveries of old knowledge which you would recognize if the quotation marks had not been forgotten by accident. So it has happened that many learn for the twentieth time that the knowledge of the minimum amount of required food is a wholesome thing, that the amount of animal fat in infant food is easily overstepped, that we have discovered that the Dutch had a clever notion when they fed babies on buttermilk with reduced fat; we are even beginning to learn what our old forefathers practised a hundred years ago, and physiologists taught a third of a century ago—namely, that the newly-born and the very young infant not only tolerate small quantities of cereals but that they improve on it. Indeed, the names of Schiller, Korowin, and Zweifel have been rediscovered. We have also learned—just lately, it appears—what was always known, that morning and night, idleness and work, health and illness, while altering the chemical composition of woman's milk do not necessarily affect its wholesome character. We are beginning to learn that it is impossible to feed a baby on fanatical chemical formulæ, for they are not prescribed by Nature, which allows latitude within certain limits. We are even beginning to learn that if that were not so there would be no artificially fed babies alive, and possibly very few participants in the St. Louis Congress of Arts and Sciences.

The inability or reluctance of women to nurse their own infants is a grave matter. From a physical, moral, and socio-political point of view there is only one calamity still graver, that is to refuse to have children at all. It undermines the health of women, makes family life a commercial institute or a desert, depopulates the child

world, reduces original Americans to a small minority, and leaves the creation of the future America in the hands of twentieth century foreigners. The human society of the future will have to see to it that no poverty, no cruel labor law, no accident, no luxurious indolence, must interfere with the nursing of infants. I believe in the perfectibility of the physical and moral conditions of the human race. That is why I trust that society will find means to compel able-bodied women to nurse their own infants. Infants are the future citizens of the republic. Let the republic see that no harm accrue from the incompetence or unwillingness to nurse. Antiquity did not know of artificial infant feeding. The first information of its introduction is dated about 1500. Turks, Arabs, Armenians, and Kurds know of no artificial feeding today. It takes modern civilization to expose babies to disease and extinction. I know of no political or social question of greater urgency than that of the prevention of the wholesale murder of our infants caused by the withholding of proper nutriment. May nobody, however, feel that all is accomplished when an infant has finally completed his 12 months. Society and family owe more than life—they owe good health, vital resistance, and security against life-long invalidism.

But even willing mothers may have no milk. We require a stronger, healthier race, and one that physically is not on the down grade. The nursing question is a social and economic problem like so many others, like the childbearing question, that confront modern civilization.

We are building hospitals for the sick of all classes, and insist upon their being superior to the best private residences; asylums for the insane, neuropathics, and drunkards; nurseries and schools for epileptics, cretins, and idiots; refuges for the dying consumptives; and sanatoria for incipient tuberculosis. We are bent upon curing and upon preventing. Do we not begin at the wrong end? We allow consumptives and epileptics to marry and to propagate their own curse. We have no punishment for the syphilitic and the gonorrhœic who ruins a woman's life and impairs the human race. Man, however, should see that his kind must not suffer. One-half of us should not be destined to watch, and nurse, and support the other half. Human society and the State have to protect themselves by looking out for a healthy, uncontaminated progeny. Laws are required to accomplish this; such laws as will be hated by the

epileptic, consumptive, the syphilitic, and the vicious. No law ever suited the degenerates against whom they were passed, and it is unfortunate that while health and virtue are as a rule not contagious, disease and vice are so to a high degree.

Modern *Therapeutics*, both hygienic and medicinal, has gained much by the close observation of what is permitted or indicated or required in early age. Since it has become more humane (remember it is hardly a century since Pinel took the chains off the insane in their dungeons, and not more than half a century since I was taught to carry my venesection lancet in my vest pocket for ready use) and more scientific, so that whatever is outside of strict biologic methods is no longer "a system," but downright quackery—the terrible increase of the latter as a world-plague is deemed by rational practitioners and the sensible public an appalling anachronism. It appears that the States of the Union are most anxious (and have been partially successful) to rid themselves of it, while some at least of the nations of Europe are greater sufferers than we. According to the latest statistics, there is one quack to every physician in Bavaria and Saxony; ten quacks in Berlin, with its emperor and other accomplishments, to every forty-six physicians. Its general population has increased since 1879 by 61%; the number of physicians, 170, 2%; that of the quacks, 1,600%.

One of the main indications in infant therapeutics is to fight anemia, which is a constant danger in the diseases of the young, for the amount of blood at that age is only one-nineteenth of the whole body weight, while in the adult it is one-thirteenth. The newly-born is particularly exposed to an acute anemia. His blood weighs from 200 to 250 grammes. It is overloaded with hæmoglobin which is rapidly eliminated, together with the original excess of iron. This lively metabolism renders the infant very amenable to the influence of bacteria, and the large number of acute, sub-acute, or chronic cases of sepsis is the result. Besides, the principal normal food is milk, which contains but little iron. That is why pediatrics is most apt to inculcate the lessons of appropriate posture, so as not to render the brain suddenly anemic, and of proper feeding and of timely stimulation before collapse tells us we are too late, and the dangers of inconsiderate depletion. The experience accumulated in pediatric practice has taught general medicine to use small doses only of potassic chlorate;

large doses of strychnine and alcohol in sepsis, of mercuric bichloride in croupous inflammations, of heart stimulants, such as digitalis, when a speedy effect is wanted, of arsenic in nervous diseases, of potassic iodide in meningitis; it has warned practical men of the dangers of chloroform in status lymphaticus;¹ it has modified hydrotherapeutic and balneological practice, and the theories of hardening and strengthening according to periods of life, and to the conditions of previous general health.

The appreciation of electricity as a remedy has been enhanced by obstetricians, pediatricists and general practitioners. It is but lately that we have been told (P. Strassmann, *Samml. Klin. Vortr.*, 1903, No. 353) that a newly-born and an infant up to the third week are perfectly insensible to very strong electrical currents. The incompetency of mere experimental work, not corrected or guided by practice, cannot find a better illustration, for there is no more powerful remedy for asphyxia and atelectasis than the cautious use of the interrupted or of the broken galvanic current.

The domain of preventive therapeutics expands with the increased knowledge of the causes of disease. That is why immunizing, like curative serums, will play a more beneficent part from year to year, and why the healthy condition of the mucous membrane of the nose, mouth, and pharynx, which I have been advising these forty years as a prevention of diphtheria, has assumed importance in the armamentarium of protection against all sorts of infectious diseases.

Amongst the probabilities of our therapeutical future I also count the prevention of congenital malformations, which, as has been shown, are more numerous than is generally known or presumed, and often the result of intrauterine inflammation. In a recent publication F. von Winckel (*Samml. Klin. Vortr.*, 1904, No. 373) emphasizes the fact that the general practitioner or the pathologic anatomist sees only a small number, that indeed the majority are buried out of sight, or are preserved in the specimen jars of the obstetrician. The known number of malformations compared with that of

¹ In the meeting of the Society for the Study of Disease in Children, May 27, 1904, Mr. Thompson Walker alluded to the collection of ten cases with status lymphaticus in which death had occurred at the commencement of chloroform administration, or during it, or immediately after the operation. In addition to the usual changes, a hyperplasia of the arteries had been noted, leading to narrowing of the lumen.

the normal newly-born varies from one to thirty-six, to one to one hundred and two or more. They are met with in relatively large numbers on the head, face and neck—altogether in 53.2% of all the 190 cases of malformation observed in Munich during 20 years. A number of them is the result of heredity, of syphilis or other influences. How many are or may be the result of consanguineous marriages will have to be learned. In all such cases the treatment of the parents or the prohibition of injurious marriages will have to be insisted upon. The number of those recognized as due to amniotic adhesions or bands is growing from year to year. Küm-mel could prove that of 178 cases, 29 were certainly of that nature. External malformations have long been ascribed to them; proximal malformations, such as auricular appendices, harelip, anencephalia, cyclopia, flattening of the face, anophthalmia, hereditary polydactylia (Ahlfeldt and Zander, Virchow's Archiv, 1891), and lymphangioma of the neck, have been found to be caused by amniotic attachments or filaments. Is it too much to believe that the uterus, whose internal changes, syphilitic or others, are known to be very accessible to local and general medication, should be so influenced by previous treatment that malformations and foetal deaths will become less and less frequent?

The problem of the health and hygiene mainly of the older child refers to more than its food. The *school* question is in the foreground of the study of sanitarians, health departments, physicians, and pedagogues. Its importance is best illustrated by the large convention which was organized in Stuttgart, April, 1904, as an International Congress for School Hygiene. Pediatricists, pedagogues, and statesmen formulated their demands and mapped out future discussions. Rational pediatrics would consider the following questions: Is it reasonable to have the same rule and the same daily sessions for children of eight and perhaps of fifteen years, and for adolescents? Certainly not. The younger the child the shorter should be the session, the longer and more frequent the recesses. There should be no lessons in the afternoon, or only mechanical occupations, such as copying, or light gymnastics. There should be no home lessons.

The problem of overburdening was carefully considered by Lorinser in 1836, and by many since. It deals with the number of subjects taught, the strictness and frequency of official examinations, and should consider

the overcrowding of school rooms. We should try to answer the question whether neuroses are more the result of faulty schooling or of original debility, heredity, underfeeding, lack of sleep, bad domestic conditions, or all these combined. In Berlin schools they have begun to feed the hungry ones regularly with milk and bread. No compulsory education will educate the starving. The child that showed his first symptom of nervousness when a nursling, the child with pavor nocturnus, or that gets up tired in the morning, or suffers from motor hyperæsthesia, pointing or amounting to chorea, unless relieved instead of being punished by an uninformed or misanthropic or hysterical teacher, gets old or breaks down before the termination of the school term or of school age. There should be separate classes for the feeble, for those who are mentally strong, or weak, or of medium capacity. All of such questions belong to the domain of the child's physician, the physician in general. The office of school physician is relatively new. Whatever we have done in establishing it in America has been preceded by countries to which we are not in the habit of looking for our models. Bulgaria and Hungary have no schools without physicians. On the other hand, Vienna has none for its 200,000 school children. It is reported that the aldermen refused to appoint one. One of them objected for the reason that the doctor might be tempted to examine the Vienna lassies too closely. His business would be, and is, to look out for the healthfulness of the school building, its lighting, warming, cleanliness, the cleanliness of the children and their health, and that of the teachers. A tubercular teacher is a greater danger to the children than these, who rarely expectorate, to each other. He would take cognizance of the first symptoms of infectious diseases, examine eyes, ears, and teeth, and inquire into chronic constitutional diseases, such as rachitis and scrofula in the youngest pupils. He might undertake anthropometrical measurements and benefit science while aiding his wards. He would be helped in all these endeavors by the teachers who must learn to pride themselves on the robust health of their pupils, as they now look for the accumulation of knowledge which may be exhibited in public examinations.

They would soon learn what Christopher demonstrated, that physical development, greater weight, and larger breathing capacity, correspond with increased mental power, joining to this the advice that a physical

factor as well as the intellectual one, now entirely relied upon, should be introduced in the grading of pupils. (Charles F. Gardiner and H. W. Hoagland, *Growth and Development of Children in Colorado*.—Trans. Am. Climatological Ass'n, 1903.)

Our knowledge of the physiology and pathology of the *nervous system* of all ages would be defective without lessons derived from the foetus and infant. Amongst the newly-born we have often to deal with arrests of development, such as microcephalus, or with that form of foetal meningitis or of syphilitic alterations of blood-vessels which may terminate in chronic hydrocephalus. When the insufficient development of reflex action in the newly-born up to the fifth or sixth week has passed, the very slow development of inhibition during the first half year or more, together with the rapid increase of motor and sensitive irritability explains the frequency of eclampsia and other forms of convulsions. Many of them require, however, an additional disposition, which is afforded either by the normal rapid development of the brain, or the abnormal hyperemia of rachitis. The last 25 years have increased our knowledge considerably in many directions. Congenital or premature, complete or partial, ossification of the cranial sutures lead mechanically to idiocy, or paralysis, or epilepsy; it is a consolation, however, to know that the victims of surgical zeal are getting less in number since operators have consented to fear death on the operating table, and thoughtful surgeons have come to the conclusion to leave bad enough alone. In the very young the fragility of the blood-vessels, the lack of coagulability of the blood, the large size of the carotid and vertebral arteries, the frequency of trauma during labor and after birth, the vulnerability of the ear and scalp, contribute to the frequency of nervous diseases, which before the fifth year amounts to 87% of all the cases of sickness. Rapid exhaustion leads to intracranial emaciation and thrombosis, the so-called hydroencephaloid of gastro-enteritis. The large size and number of the lymph vessels of the nasal and pharyngeal cavities facilitate the invasion into the nerve centers of infections which show themselves as tubercular meningitis, cerebro-spinal meningitis, and polio-encephalitis, or more so, poliomyelitis, and as chorea of so-called rheumatic—mostly streptococcic—origin. Nose and throat specialists, as well as anatomists, have contributed to our knowledge on these points—another

proof of the intimate dependency of all parts of medicine upon one another. Now all these conditions are not limited to early life, but their numerical preponderance at that time is so great that it is easy to understand that general nosology could not advance without the overwhelming number of well-marked cases amongst children. Amongst them are the very numerous cases of epilepsy. They escape statistical accuracy, for many an epileptic infant or child dies before his condition is observed, or diagnosticated; a great many cases of petit mal, vertigo, dreamlike states and somnambulism, fainting, habit-chorea, truancy, imbecility, incompetency, or occasionally wild attacks of mania, or the perversity of incendiarism, or in older children religious delirium, even hysteric spells, are overlooked or perhaps noticed or suspected by nobody but the family physician; or, in the cases of the million poor, by nobody. They are cared for or neglected at home, and the seizure is taken to be an eclamptic attack due to bowels, worms, colds, and teeth, exactly like three hundred years ago.

Of equal importance in this disease to the pediatricist, the pedagogue, the psychiatrist, the judge, the statesman, no matter whether in office or a thoughtful citizen, is the influence of heredity. The old figures of Echeverria, which have been substantiated by a great many observers, tell the whole story. One hundred and thirty-six epileptics had 553 children. Of these, 309 remained alive; 78 (25%) were epileptic; how many of the 231 that died had some form of epilepsy or would have exhibited it nobody can tell. He observed a dozen cases in one family. While in his opinion 29.72% showed a direct inheritance from epileptic parents, Gowers has a percentage of 35, and Spratling, who has lived among epileptics nearly a dozen years, 66.

Epilepsy is acknowledged to be one of the causes of imbecility, or genuine idiocy. In very many instances it should be considered as the co-ordinate result of congenital or acquired changes in the skull, the brain, and its meninges, and particularly the cortex. In a single idiot institution, that of Langenhagen, 15% to 18% of the 395—668 inmates were epileptic; in another, Dalldorf, 18.5% to 24.3% of 167—344; in a third, Idstein, 36% of 101 (Binswanger, in Nothnagel, Syst. Path. u. Ther., Vol. xii, 1,310).

Its main causes are central. External irritations, worms, calculi, genital or nasal reflexes, may be occasional proximate causes. But cauterization of the nares,

and still more, circumcision, and clitoridectomy prove more the helplessness or recklessness of the attendant than the possibility of a cure. The individual cases of recovery by the removal of clots, bones, or tumors, are great and comforting results, but if epilepsy and its relations are ever to disappear, it is not the knife of the surgeon but the apparatus of human foresight and justice that will accomplish it. Most of the causes of epilepsy are preventable. To that class belong syphilis and alcoholism in various generations, rachitis, tuberculosis and scrofula, many cases of encephalo-meningitis, and most cases of otitis. A question is attributed to a royal layman, "If preventable, why are they not prevented?" If there is a proof of what Socrates and Kant said, namely, that statesmanship cannot thrive without the physician, it is contained in the necessities of epilepsy. Prevention, preventives, and hygienic, medicinal, and surgical aids have to be invoked, unfortunately with slim results so far.

The influence of hereditary syphilis on the diseases of the nervous system has been studied these 20 years, both by neurologists and pediatricists. Its results are either direct—that means characteristically syphilitic—or meta-syphilitic—that means merely degenerative. Hoffmann cured a case of syphilitic epilepsy in a girl of nine years in 1712. Plenck describes convulsions and other nervous symptoms depending on hereditary syphilis, and Nil Rosen de Rosenstein describes the same in 1781. The literature of the later part of the eighteenth, and of the first half of the nineteenth century is silent on that subject, though the cases of affections of the nervous system depending on hereditary syphilis are very frequent (thirteen percent of all the cases, according to Rumpf *die Syph. Erk. d. Nervensystems*, 1889). Jullien (*Arch. Gén.*, 1901) reports 206 pregnancies in 43 syphilitic matrimones. Of the children, 162 remained alive. Half of them had convulsions or symptoms of meningitis.

According to Nonne (*die Syph. d. Nervens.*, 1902) hereditary syphilis differs from the acquired form in this—that several parts of the nervous system are affected simultaneously; and that arteritis, meningitis, gummata, and simple sclerosis occur in combination. Simple cerebral meningitis and apoplexies are very rare. Encephalitis is more frequent. Probably spinal diseases are more frequent, according to Gilles de la Tourette, Gasne, Sachs, and others. *Tabes dorsalis* is not frequent, but may rather depend on an atavistic syphilitic

basis; for altogether the nerve syphilis of the second previous generation as a cause of disease in the young is not very rare. (E. Finger, W. klin. Woch., 13, 1900.)

What we call neuroses are not infrequent in infants and children. Neuralgias are not so common as in the adult, but would be more frequently found if sought for. Even *adipositas dolorosa* has been observed in childhood. Hysteria is by no means rare and its mono-symptomatic character, so peculiar to early age, adds to its nosological importance. Its early appearance is of grave import. Its often hereditary origin makes it a serious problem, under-alimentation or ill-nutrition, rachitis and scrofula, frequently connected with and underlying it, may make it dangerous and a fit subject for the study of educators, psychologists, judges, and all those whose direct office it is to study social and socialistic problems. Hysteria is not quite unknown amongst males, though the large majority are females.

Some of the vaso-motor and trophic disturbances are less, others more frequent, in the young than in the adult. Amongst 129 cases of *akroparæsthesia* there is only one of Frankl Hochwart in a girl of 12 years, and one of Cassirer in a girl of 16. Sclerodermia is met with mostly in mature life, but the cases of Neumann at 13 days, and those of Cruse, Herxheimer, and of Haushalter and Spielmann, who observed two cases in one family, all of them when the infants were only a few weeks old, prove that the same influences which are at work in advanced age, namely, hereditary disposition, neuropathic family influence, low general nutrition, colds, trauma, and so on, may play their role in infant life. Nor are infant erythromelalgias numerous. Henoch saw one in a teething infant, Baginsky in a boy of 10, Heimann one in a girl of 13, Graves one in a girl of 16; that means three or four cases below 13 or 16 years of age, out of a number of 65 collected by Cassirer in his monograph. (*Die Vasomotorisch-trophischen Neurosen*, Berlin, 1901.) In half a century I have seen but one that occurred in early age, namely, in a boy of 12, who got well with the loss of two toes. On the other hand, the symmetrical gangrene of Raynaud and acute circumscribed oedema of Milton and Quinke, 1882, treated of by Collins in 1892, are by no means relatively rare in infancy and childhood. There are a few cases of the former that occurred in the newly-born. Two I have seen myself. There are those which have been observed at 6 months (Friedel), 9 months (De France),

at 15 months (Bjering), at 18 months (Dick). In the year 1889 Morgan collected 93 cases, 13 of which occurred from the second to the fifth, 11 between the fifth and tenth, and 15 between the tenth and twentieth years. Amongst the 168 cases collected by Cassirer, 20 occurred below the fifth, 8 between the fifth and tenth, and 25 between the tenth and twentieth years of life. Like most nervous diseases, these cases had either congenital or acquired causes, amongst which a general neuropathic constitution, and the hereditary influence of alcohol, chlorosis, and anemia are considered prominent. Of acute circumscribed œdema, 28 cases are found below nine years of age in Cassirer's collection of 160 cases, one of which at the age of one and a half months is reported by Crozer Griffith, one at three months by Dinckelacker. Again hereditary influence is found powerful. Osler could trace the disease through five generations.

The connection of pediatrics with *psychiatry* is very intimate. Insane children are much more numerous than the statistics of lunatic asylums would appear to prove, for there are, for obvious reasons, but few insane children in general institutions. It is only those cases which become absolutely unmanageable at home that are entrusted to or forced upon an asylum. The example of the French, who more than 50 years ago had a division in the Bicêtre for mentally disturbed children, has seldom or not at all been imitated. Thus it happens that though not even a minority of the cases of idiocy become known, its statistics is more readily obtained than that of dementia of early life. Some of its physical causes or accompaniments have been mentioned— asphyxia with its consequences, ossification and asymmetrical shape of the cranium, accidents during infancy and childhood, neuroses that may be the beginning or proximate causes of graver trouble. Infectious diseases play an important part in the etiology of intellectual disorders. Althaus collected 400 such cases. They were mainly, influenza 113, rheumatism 96, typhoid fever 87, pneumonia 43, variola 41, cholera 19, scarlatina 16, erysipelas 11. In most of the cases there were predisposing elements, such as heredity and previous diseases, or over-exertion of long duration. The over-worked brains of school children were complained of as adjuvant causes of lunacy by Peter Frank as early as 1804. We are as badly off, or worse, a hundred years later.

There is one ailment, however, that appears to hurt

children less than it does adolescents or adults, that is masturbation. There are those cases, fortunately few, which depend on cerebral disease, and original degeneracy, but in the large majority of instances masturbation, frequent though it be, has not in the very young the same perils that are attended with it later on when the differentiation of sex has been completed and is recognized. Babies under a year, and children under 8 or ten will outlive their unfortunate habit, and do not appear to suffer much from its influence. Whatever is said to the contrary is the exaggeration of such as like to revel in horrors. The same exorbitant imagination is exhibited in other statements. What Lombroso and his followers have said of the faulty arrangement of the teeth, prognathic skulls, retracted nose, short and attached lobes of the auricle, as distinct symptoms of mental degeneracy, belongs to that class, and need not always be taken as the positive signs of insane criminality. There is so much poetical exaggeration and word painting in them that Lombroso and also Krafft-Ebing are the pets of the prurient lay public. In its midst there must be many who are anxious to believe with Lombroso that brown hair and eyes, brachycephalic heads, and medium size of the body characterizes the insane criminal, if only for the purpose of scanning the hair and eyes and heads of their near friends and their mother-in-law's relatives.

It is certainly not true that, as Lombroso will have it, children are cruel, lazy, lying, thievish, just as little as according to him all savages are like carnivorous animals, and essentially criminal, while others are convinced that by nature they are amiable, like Uncas, and virtuous like Chingacook, and have been rendered savage only by the strenuousness of conquering immigrants. Nor is it true that the idiot brain is merely arrested at a stage similar to anthropoid, or even saurian development, for it is less arrest of development than the influence of embryonal or foetal disease, beside amniotic anomalies that cause the irregularities of the encephalon.

Amongst the worst causes of idiocy is cretinism, both the endemic, and the sporadic. Every cretin is an idiot, not vice versa. The first could be prevented by State interference which would empty the stricken valleys; the latter depends on thyroidism, with or without a shortening of the base of the skull, and is partially curable. The idiotism of cretinism causes a fairly uniform set of symptoms; that which depends on other

causes exhibits varieties, though not so many as imbecility, which, too, should not be taken to be the result of a single cause. Osseous and cartilaginous anomalies about the nose are pointed out by William Hill, chronic pharyngitis and nasal polypi by Heller, enlarged tonsils by Kafemann in one-third of the cases, some pharyngeal or nasal anomaly in four-fifths by Schmid-Monnard. Adenoids are frequently found as complications. Operations to meet all these anomalies have been performed with improvement of the mental condition in some, of the physical in many more, mainly when the anomalies were complications only. But after all we should beware of the belief in miracles and in infallible cures. Mainly the tonsils have been puffed up to be the main causes of many human troubles and their removal a panacea. According to a modern writer it prevents tuberculosis, but the prophet is a little too bold, for he adds that with the exception of himself there are very few able to accomplish it. Defective or diseased brains are frequent in most conditions. The former class allows even imbeciles to excel in some ways. In that class may be found calculating experts, chess-players, or mechanical draughtsmen.

Imbecile persons may be taught sufficiently to prepare for the simple duties of life. There are however many transitions between the complete imbecile, the mild imbecile, and the merely slow and dull. That is why the condition is frequently not appreciated. In his school the imbecile child is slightly or considerably behind his class, and the laughing-stock of the rest. As he is intellectually slow, so he is morally perverse or is made to become so. He knows enough to lie and libel, to run away from school, and from truant to become a vagrant. It is true it will not do to declare the imbecile *per se* identical with the typical criminal, but as many of them are illegitimate, or of defective or alcoholic parents, or maltreated at home, or diseased and deformed, they get by necessity, into conflict with order and the law. Thompson found 218 congenital imbeciles among 943 penitentiary inmates. Knecht, 41 amongst 1,214. When the imbecile is once a prisoner his condition is not liable to be noticed on account of the stupefying monotony of his existence.

What is more to be pitied, the fate of the immature or imbecile half-grown child that naturally acts differently from the normal, or the low condition of the State which instead of procuring separate schools for the half-

witted, or asylums, has nothing to offer but contumely and prison walls, and increasing moral deterioration? There is the stone instead of the bread of the gospel.

Modern society has commenced, however, to mend old injustices. Every civilized country admits irresponsibility before the law below a certain age, and gradually the mental condition of the criminal is taken into consideration and made the subject of study. But still thousands of children and adolescents are declared criminal before being matured. The establishment of children's courts is one of the things, imperfect though they be, that make us see the promised land from afar. When crime will be considered an anomaly, either congenital or acquired in childhood, a disease; when society will cease to insist upon committing a brutality to avenge a brutality; when self-protection will take the place of revenge, and asylums that of State prisons—then we shall be a human, because humane, society.

CONCLUSIONS.

Pedology is the science of the young. The young are the future makers and owners of the world. Their physical, intellectual and moral condition will decide whether the globe will be more Cossack or more Republican, more criminal or more righteous. For their education and training and capabilities, the physician, mainly the pediatricist, as the representative of medical science and art, should become responsible. Medicine is concerned with the new individual before he is born, while he is being born, and after. Heredity and the health of the pregnant mother are the physician's concern. The regulation of labor laws, factory legislation, and the prohibition of marriages of epileptics, syphilitics, and criminals are some of his preventive measures to secure a promising progeny. To him belongs the watchful care of the production and distribution of foods. He has to guard the school period from sanitary and educational points of view, for heart and muscle and brain are of equal value. It is in infancy and childhood, before the dangerous period of puberty sets in, that the character is formed, altruism inculcated, or criminality fostered. If there be in the commonwealth any man or any class of men with great possibilities and responsibilities it is the physician. It is not enough, however, to work at the individual bedside and in a hospital. In the near or dim future, the pediatricist, the physician, is to

set in and control school boards, health departments, and legislatures. He is the legitimate adviser to the judge and the jury, and a seat for the physician in the councils of the republic is what the people have a right to demand. Before all that can be accomplished, however, let the individual physician not forget what he owes to the community now. Mainly to the young men amongst us I should say, do not forget your obligations as citizens. When we are told by Lombroso that there is no room in politics for an honest man, I tell you it is time for the physician to participate in politics, never to miss any of his public duties, and thereby make it what sometimes it is reputed not to be in modern life—honorable. A life spent in the service of mankind, be our sphere large or narrow, is well spent. And never stop working. Great results demand great exertions, possibly sacrifices. After all, when everything in science and politics that now is our ideal will be accomplished while we live or after we shall be gone, we shall still leave to our progeny new problems.

THE FOUNDATIONS AND AIMS OF MODERN PEDIATRICS.¹

BY

DR. THEODORE VON ESCHERICH,
of Vienna, Austria.

Professor of Pediatrics, University of Vienna.

Pediatrics, as far as it is connected with directions as to the care of the newborn and nurslings, belongs with midwifery to the oldest branches of medicine; but, in its scientific development, it is among the youngest. Not until the end of the eighteenth century did it separate itself sufficiently from the trammels of obstetrics to allow the first independent book on the diseases of the newborn and children, the wellknown work of Rosenstein, to appear. This contains, as do similar works which appeared in the next few years, an unsystematic account of the diseased conditions occurring in or peculiar to children, and among these only those with evident symptoms and concrete changes found especial or detailed consideration. It was not until the French Revolution that the new school of medicine came into existence, and it we must thank for the creation of scientific pediatrics as well as for the birth of modern medicine.

We will seek to sketch in a few words the origin and changes of the leading ideas up to the present time, as this best gives the trend which further development will take in the near future.

Liberation from the ban of natural philosophy and humoral pathology was brought about by the sobering influence of pathologic anatomy, which pointed in no uncertain way to visible changes in individual organs as the origin and seat of diseases. Billard is the most brilliant example of this school, which erected a clinical structure as a commentary to the anatomic changes determined by extremely numerous and carefully performed autopsies.

The lesions themselves he considered in Broussais'

¹ A paper read before the Pediatric Section of the International Congress of Arts and Science, at the World's Exposition, at St. Louis, September 21, 1904.

sense only as different grades of inflammation, and although to this day his work is still a mine of important and useful facts, it is clear that this clever conception could not by itself fulfil our practical needs, at least not in childhood, where the short duration of diseases generally prevents the occurrence of extreme anatomic changes, and where even today, with the help of microscopic and bacteriologic methods, we are often at a loss to bring the autopsy findings into agreement with the clinical course. This lack of agreement is most marked in the domain of the diseases of the gastrointestinal tract in infancy, and it was on them that the opposition, keenly led by Barrier, established the "Diacrisis doctrine," with which they steered back again into the sea of humoral pathology.

Uninfluenced by these theoretic discussions, however, both parties labored to develop the new science with the newly-discovered methods of exact investigation of diseases and the untrod realm of statistics, and thus they created the basis of a special pathology and therapy of childhood, of which the work of Rilliet and Barthez forms a model presentation of the whole subject. With these men the French school of pediatry ceased to occupy the leading position which it had held. The Vienna school became its heir just as in the realm of internal medicine, where under the powerful influence of Rokitsansky and Skoda the same favorable conditions for development existed. Here also the clinical study was mostly founded on the basis of pathologic anatomy, as may be learned from the excellent work of Bednar, "*Ueber die Krankheiten des Neugeborenen und Säuglings* (On the Diseases of Newborn and Infants)," and the important studies of Ritter of Prague. At the same time clinical symptomatology and casuistry were developed in the newly-erected clinic of the St. Anna Kinderhospital in Vienna under Mayr and his disciple and successor, Widerhofer, and the clinical types of disease were determined conclusively from the ample material. In a similar manner worked Hensch in Berlin, West in London, and Filatow in Moscow, so that at the end of this period the clinical knowledge and symptomatology of pediatrics were developed as far as it was possible with the simpler methods of investigation.

However important this brilliant clinical development and the sharp definition of its separateness was for the recognition of pediatrics as a distinct science, still following this direction a dead point was soon reached,

from which a new route had to be opened up if dulness and routine were not to take the place of scientific investigation. With this, German pediatrics in the narrower sense of the word came into the foreground. At first it had to struggle with great difficulties on account of the lack of separate children's hospitals and of government aid, and in the first half of the century it was almost entirely under French influence. Later the peculiar organization of university policlinics, which were charged with the instruction in pediatrics, brought it about that the care of pediatrics fell to the representatives of internal medicine. I will mention here only the name of Gerhardt, the founder of German pediatrics.

It lay in the nature of this relation that in Germany, in a certain contrast to the French and Austrian schools, the common points of contact with internal medicine and the diseases of later childhood closely related to the same, were preferably studied.

Even though the creation of independent chairs of pediatrics in the German Universities was improperly delayed by this relation, it had the advantage that the establishment of the rapidly growing natural sciences which was taking place at this period under the influence of German internists came immediately and quickly to the service of the clinic of children's diseases. The clearer knowledge of the disease processes made possible thereby emphasized more and more the identity of most of the diseases occurring in children and in adults, and led them to seek the explanation of their differences in the peculiar characteristics of the youthful organism. Of special importance from this standpoint is the study of artificial feeding carried on with such great energy by German authors (Biedert); this demonstrated in the most convincing manner the unfinished condition of the infantile digestive organs and the consequences arising therefrom. On this basis the modern German school developed, which by means of the methods developed especially in internal medicine, saw the aim of modern pediatrics in the investigation of those physiologic peculiarities of the childish organism, which cause the differences between its reaction under physiologic and pathologic conditions, and that observed in adults. Recently the term pathologic physiology of childhood has been used for this science. A similar road is being traversed by the rising school of American pediatry; under the leadership of Jacobi it has attached itself closely to the doctrines of the German school.

Thus we see the problems of pediatrics extended from an investigation of diseased processes peculiar to childhood, as conceived by the older pediatricists, to a general consideration of all pathologic conditions occurring during this period of life. If I characterize this as the current ruling at present and consider it the problem of the immediate future for pediatrics, it must also be stated that the solution of the part of this task belonging to physiology or general pathology is not a problem for the pediatricist alone, but can only be taken up successfully if assistance is had from workers in other lines. It is recognized that pediatrics has at all times taken an active and useful part in the building up of general medicine and in the working out of questions of special clinical interest, which has been made possible to a great degree by the peculiarity of its material.

Of the greatest importance for the development of modern pediatrics has been the introduction of exact methods of clinical diagnosis, which developed in the middle of last century with the great renaissance of the exact sciences. If this revolution was of great aid in the study of diseases of adults, how much more for those of early infancy, in which subjective statements and so many other diagnostic helps are lacking, and the physician is almost entirely dependent on the information derived from objective phenomena. The introduction into pediatrics of percussion and auscultation, so necessary to the knowledge of lung and heart diseases, took place relatively late and slowly. Not until in the forties were they used systematically, especially by German physicians, to whom we must also be thankful for the only book (Sahli) devoted exclusively to percussion of the organs in childhood.

Of scarcely less importance in diagnosis was the adoption of the thermometer which, especially in the forms of rectal measurements, can be used so easily in children, even by the laity. This last fact has made it a specially important and reliable instrument. Even though the first thermometric researches were made by Roger, the development of the technic and the working out of typical fever curves is a merit of the German school, especially that of the University of Leipsic. Together with inspection and palpation, methods which were always used, percussion, auscultation, and thermometry form the trio which is indispensable in the examination of every child, and makes possible the certain diagnosis of many previously unrecognized diseases. The endo-

scopic methods are used wherever the technical accomplishment in children is possible. By far the most important is the inspection of the throat and mouth, as well as the examination of the ear, all of which are comparatively easy to practise, while the laryngoscopic and ophthalmoscopic methods are more rarely used. Electric examination also belongs to the physical methods of examination which are only used under exceptional circumstances, but the importance of which has been increased by the discovery of the frequent increase of electric excitability in early childhood, and radiosopic investigation, which permits a previously unsuspected insight into the conditions of the bony development as well as the changes in the more deeply situated heart and lungs.

Aspiration of pathologic fluids introduced by Dieulafoy, is an especially useful and valuable method in childhood, and to it lumbar puncture introduced by Quinke has been added. We may say that the manifold varieties of the processes occurring in the meninges have only been made manifest by the latter. Other methods, especially the graphic, are for evident reasons less used in children, although certain authors (Rauchfuss) have succeeded in overcoming the difficulties. On the other hand the histologic methods of investigation are made of great importance by the number and variety of the anemic states, although our knowledge of the pathogenesis of these diseases has not been very much advanced thereby.

In contrast to the physical methods whose technic is generally simple, permitting a relatively rapid development of the realms of knowledge opened up by them, are the chemic methods, which are still undeveloped in spite of the high development of organic chemistry. The subjects of chemic investigation are especially the excreta of the body, the urine and the feces. The study of urine has for a long time, at least in early infancy, been improperly neglected on account of the difficulty in collecting it. Thanks to Kjelberg's suggestion the catheter is now more frequently used for the collection of urine, especially in girls, while in boys we use the Raudnitz urinal. As a result unexpected frequency and variety of albuminuria have been shown, in the study of which Heubner has done especial service. Also the presence of other substances useful in diagnosis; the substances shown by Ehrlich's diazo reaction, acetone, diacetic acid, etc., were found in children of all ages. As regards

the morphologic elements, not considering the very great frequency of blood and tube casts, we will only mention the presence of bladder and kidney epithelium as well as of bacteria (generally colon bacilli) as an expression of infection of the urinary tract occurring especially often in girls. The use of the centrifuge in all these examinations is very advantageous. Another very promising method is the freezing-point determination, introduced into clinical medicine by Koranyi; it has been used repeatedly in pediatrics, in the study of the milk as well as the urine.

The collection of the stools is much easier than of the urine, at least in nurslings; they also offer much more favorable opportunities for diagnosis and analysis than do the stools of adults. While in the latter it is a mass of stinking putrefaction, composed of a third of bacteria, in the nursling, the stool on account of the much shorter intestinal tract is comparable to that obtained from a fistula of the small intestine and shows like the contents of the small intestine, acid reaction, no putrefaction and comparatively few bacteria; food constituents if found in it at all are found in relatively slightly altered condition. Another factor which considerably increases the diagnostic importance of the nursling's stool is the similarity or at least very limited variation in the character of the food, whereby the determination of a normal stool in respect to color, amount and chemic composition is rendered possible. For this reason the chemic analysis of the stools of infants, especially those partaking of breast milk, was undertaken comparatively early (Wegscheider). The composition of the bacterial flora was studied by me, by Booker, and more lately by Tissier, who points with right to the importance of the anaërobcs. Thanks to these conditions we are able to determine the pathologic changes in the digestive process of nurslings by chemic and bacteriologic examination of their stools much earlier and more exactly, and even to make the clinical diagnosis in a not inconsiderable number of cases.

The investigation of these excreta gains much in importance because their analysis enables us to gain an insight into the metabolic processes, those mysterious processes, which even though they are not life itself are at least the source of its strength and the most immediate expression of its activity. Although this matter is so very important, for the study of growth and of the dyscrasias occurring so frequently in childhood, it has

only been in recent years that we have busied ourselves with the systematic investigation of this subject, urged on by the Breslau school (Czerny). In spite of the careful investigations performed by Camerer and Heubner in the realm of *energia* only the first steps have been taken toward the clearing up of these questions, their study is made very hard by the unusual technical difficulties and the vulnerability of the infantile organism.

The science, however, which has had the greatest influence upon the development of pediatrics is that which hardly 25 years ago proceeded from the modest workshops of Pasteur and Koch, and has won in this short time so overwhelming an influence on medical thought and research. The reason why bacteriology is of such great importance to pediatrics is that in no other period of life do the infectious diseases take so great a part. Most striking from this standpoint is the earliest infancy, the pathology of which is dominated by the septic diseases produced by the widespread bacteria of suppuration. The nature of these diseases was in most cases first recognized by the demonstration of these easily cultivated disease breeders; in this field Hutinel and Fischl have rendered the best services. Investigation in the realm of the true epidemic diseases, the acute exanthemas and the infections of mucous membranes has been less successful, but the example of the diphtheria bacillus discovered by Löffler, shows how great a furthering of clinical and therapeutic knowledge is to be expected from the discovery of the disease producers. Also the discovery that not a few infections which were formerly observed only in adults, *e. g.*, tetanus, typhoid, cerebrospinal meningitis, dysentery, etc., occur also in early childhood, was first made possible by the bacteriologic demonstration of the microorganisms concerned.

Bacteriologic diagnosis received an important enrichment by the use of the reaction products of the organism called forth by the disease process, *e. g.*, the agglutinins of typhoid (Gruber, Widal). This method may serve not only for diagnostic purposes, but also for the discovery of unknown disease producers, *e. g.*, colon infection and dysentery. Jehle has demonstrated in my clinic the agglutination of pneumococci by the serum of pneumonia patients already in the first days of the disease, and lately it has been made possible to isolate the streptococcus of scarlatinal angina, which is agglutinated by scarlatina immune serum in very high dilution.

Apart from this, we receive through it an unsus-

pected look into the healing processes and protective mechanisms of nature, which are already present in childhood, and whose further study promises important revelations concerning the peculiarity of these diseases of childhood.

These facts, discovered in the course of the last decades by the use of scientific methods, have considerably extended and clarified the study of pediatrics. In place of the comparatively small number of diseases recognizable by evident characteristics, which form the contents of the older textbooks, *modern pediatrics exhibits a scientific structure, including all disturbances of the life processes, arranged according to scientific principles, and in its completeness not reached by any other specialty in medicine.* The causes of diseases as far as they are based on exogenous agencies are the same in children as in adults. It is especially bacteriologic examination, which, being in a position to show disease producers as such, has aided considerably in showing the identity of diseases which are often so different clinically. Unfortunately, our knowledge is not sufficiently advanced to make an etiologic grouping the sole basis of our classification.

Only a small number of diseases can be considered peculiar to childhood, because they are caused by events which cannot occur in the life of adults. These are the disturbances dependent upon birth and on the change from intrauterine to extrauterine life, as well as those concerning growth and development. In a certain way somewhat analogous to the occupation diseases of adults are here to be reckoned the injurious effects of school attendance, as well as the acute infectious diseases which confer lasting immunity. If, in spite of this, as daily experience and medical statistics teach, the diseases of childhood show such great differences in their number and form of manifestation, as well as in their course and termination, this can only be due to the fact that *between the growing organism of the child and that of the completely developed adult great differences exist in the reaction called forth by the disease process variations, which change constantly in the course of childhood.* The following reflection will show what close relations exist between the stage of development on the one hand and the type and course of disease on the other hand. If we take a birds-eye view of the whole field we are struck especially by the following peculiarities occurring in the course of diseases in childhood :

1. The overwhelming frequency of fatalities and diseases, especially from functional disturbances, which explains the unsatisfactory autopsy findings in so many cases.

2. The insignificant causes producing the diseases; they are much slighter than those necessary to produce the same diseases in adults. They easily escape detection, and this explains why all sorts of fantastic representations (influence of milk secretion, eruption of teeth, occurrence of worms), have been taken as explanations.

3. The more rapid course of the disease, terminating sometimes with a fatal ending, sometimes with recovery, but mostly with a typic and uncomplicated course, because occurring in a healthy organism. (The diseases which occur in earliest infancy, in which a rapid distribution of the disease process to other organs is observed as a result of early cessation of their function, form an exception.) Especially to be mentioned, is an ability to repair anatomic lesions which are not present to the same degree in later life. (Absorption of corneal scars, Fuchs.)

4. Apart from these general differences, the course of every single disease shows special peculiarities and variations when compared to the course observed in adults; these variations are according to the degree of development and functional activity of the organs concerned, and are the greater the younger the child is.

This last fact already shows that we have to do with processes which are connected with the development of the organism, and so we are again led to the conclusion that *the key to the understanding of the special pathology of the infantile organism is to be found in the study of developmental processes*. In spite of the large number of facts which are known to us, no attempt has been made, barring a but slightly known study by Barrier, to formulate general rules and points of view for the development of the infantile organism, and to make clear its relation to the pathogenesis of the diseases of childhood, as will be attempted in the following pages.

Growth, so far as we understand by this, the utilization of foodstuffs for the purposes of new formation and growth of cells (Camerer), demonstrates itself as a function of vegetative life, or more accurately expressed the inherent specific living power of the body cells, the *vital potentiality*. If we, following the idea of R. Hertwig and Exner, see in the conjunction of the male and female egg cells respectively in sexual fecundation, the excit-

ing cause for a new and limited series of asexual cell divisions, we must suppose that the power of growth is a function peculiar to the younger and youngest cell generations. We see, then, in the germinal cell, the bearer of the entire potential energy of life, which expresses itself in at first very rapid, but gradually slowing down, growth in the size of the embryo. Unfortunately, we have no useful measure for the intensity of these life or growth processes. We may soonest consider the increase in length or bulk, as such as has already been done by the physiologist, Haller. The first is the more suitable, as, it being the greatest of all body measures, progress in its growth is recognized before all others, and negative variations are excluded.

The weight and length curves taken from the work of Quetelet show insofar a corresponding course as their greatest rise occurs in the intrauterine period. From the fourth to the fifth year a gradual flattening is noted in the curve which, at least, in the case of the length curve, passes into the horizontal about the twentieth year. Properly speaking, then, if we would represent the intensity of the vital processes, there should occur a gradual sinking of the curve, so that it would return to the base line at about 100 years (as the greatest length of life), supposing that its course remains unaffected by external harmful influences. This curve, reminding one of the parabolic course of a shot hurled aloft, together with the fact that the period of ripeness and bloom of the individual is not reached until the fourth decade, has led many authors (Burdach) to the view that the greatest vital energy, together with the highest functional development and greatest power of execution occurs in the middle of life, at the highest point of this imaginary curve. This idea is certainly wrong, as not only simple consideration, but also accurate physiologic study show unequivocally that *the intensity of the metabolic processes calculated for the body measurements present is greater the smaller or younger the organism, and that it continually diminishes from the ovum on through the entire course of life*. I have represented this in a second curve. The straight red, in part dotted line, shows schematically the continually sinking life energy. The first section of this has added to it a line obtained by the application of the actual increase in length per year corresponding to the expenditure of energy for growth; it rises rapidly to the point corresponding to the beginning of fetal life. Its course corresponds to the change of the potentiality of

the embryonic cell into kinetic energy, and shows that at no other time are the energy and power of life as great as in childhood.

In absolute contradiction of this idea, however, is the wellknown fact, that no other period of life shows so large a number of sicknesses and deaths as the first years of life; during these years, about a quarter of those born perish. This phenomenon is observed to the same extent in the plant and animal kingdoms, as Lichtenstaedt has already shown in answer to a prize question presented before the Independent Economic Society in St. Petersburg. We have the opportunity every day to see how only a minimal part of the seeds sown broadcast develop, only a few of the fertilized ovums reach full development. The cause of this unnatural fatality, in spite of the excess in vital energy is *that the organs necessary for the support and protection of the life processes are at this time so undeveloped* that the slightest injury already suffices to produce an irreparable disturbance of their functions and thus destruction of life. To the extent in which these organs in the course of development grow and become stronger, the mortality falls, diminishing considerably as early as the second and third years, and reaching its lowest point in the period between the sixth and tenth years of life. The occupation of the male, the sexual activity of the female cause a rise in the mortality from the twentieth year on. In the later age periods the physiologic sinking and extinction of the life energy finds expression. Haller has expressed this relation in these characteristic words: "Infantes mori possunt, senes vivere non possunt." Infants may die, old people cannot live,

On Table 2 the mortality rate of a certain group of people based on the official German statistics is expressed, along with the curve of the sinking energy of life.

This survey brings me to what I may call the second law of growth. The functional development of each individual organ, measured by the absolute degree of ability for work, takes during childhood a rising course, which, however, is different for each organ, and which as a rule shows a much steeper course than that of the growth curve. Unfortunately we lack the scientific data which would enable us to display graphically the gradual growth of the development and the functional ability of the most important organs of the circulatory, respiratory, digestive tract, etc. In general, however, we may conclude on the basis of anatomic and physiologic data that this occurs comparatively quickly, while

other functions, like muscular power, reach their maximum at a much later date. We may consider the overcoming of influences injurious to the organism, in other words, the degree of the power of resistance, as the common result of all these powers, which finds an expression in the statistics of the frequency of diseases and deaths. That the measure so obtained is only relatively useful and even then only under certain definite suppositions, is seen by the consideration of the first section of intra-uterine life. Although here the organs have the least power of resistance, diseases rarely occur on account of the protected condition of the fetus. But the transition into extrauterine life already necessitates a wonderful precision of preformed mechanisms. The least failure of these, causes the greatest danger to the life of the child, and thus is explained the high mortality peculiar to the act of birth and the period immediately following. This is aided by the conditions of extrauterine life being felt for a time by the newborn as a direct irritant, whose harmful influence can only be lessened by the most constant and proper care. The more backward the development of the child (premature birth), the less favorable the environment (poverty, illegitimacy, unsuitable nourishment), so much the smaller is the expectation of preserving the life of the child. Under unfavorable social conditions, the mortality rises to 70% of the births, while in well-to-do families it may sink to 10%, or even lower. Much more important than these external influences, is the rapid development of the organs occurring at this time, especially that of the digestive tract, which, according to Bloch's investigations, reaches its full histologic development from the third to the fourth year of life. This rapid improvement in resisting power, associated with high vital energy, together with the care and protection which guards the child in the parents' house, brings about the period of greatest health, which continues to the end of childhood, and in which disease and death sink to a minimum. The functional development, however, is by no means completed yet with this stage. Rather now begins, after the preservation and protection of life under normal conditions has been assured, the growth of that power and reserve strength which enables the adult to take up the struggle for existence and to care for the continuance of the species under the best possible conditions; the development of strength and activity in the musculature, becoming accustomed to fatigue, to different kinds of nour-

ishment, to climatic influences, and especially the development and training of the mental powers. Into this period falls also the strengthening of the protective influences necessary for the overcoming of infectious disease, the acquiring of immune substances, etc.

The occurrence of this long so-called puerile period, which is given over mostly to the functional development by relatively slight increase in length and weight, belongs, like the long duration of childhood, among the most eminent peculiarities of development in the human species. There is no doubt that man owes to this slow development and maturing not only the high state of his mental and physical abilities, but also his enormous power of accommodation and functional adaptation which enables him, in contrast to lower forms of life, to exist under the widest extremes of climate, foods, and habits of life, and thereby to make himself really the lord of the world. It would, however, be a fundamental error to believe that this progressive development of functions and organs, which characterizes childhood, occurs to an equal extent in all parts, like the growth of a crystal, which increases in size by addition of equal amounts over the whole surface of the nucleus. The study of embryology, which shows such remarkable changes in the form of the embryo, protects us from this unfortunately widespread opinion which regards the child as the exact image in small size of the adult. The table devised by Langer shows the great differences which on closer observation are seen to exist between the form of the child and that of the adult. But that not only the outward form, but also the internal organs experience during the course of growth a continual change in their relative size, is shown in the table prepared at my suggestion by Oppenheimer; it displays the weight of the organs at the different years of life (compared with the weight of the organs in the newborn). The consideration of these relationships, together with the observations already mentioned, shows that the *growth of the individual organs does not occur simultaneously, but with varying intensity, so to speak by jerks and that the order is caused by the greater or lesser importance of the developing organs for the preservation or protection of the infantile life.* This I call the third rule of growth.

The life of the child in utero and at the beginning of its extrauterine existence is so purely vegetative, as to make Plato consider seriously the question whether the

newborn is actually to be considered as a human being. But just as the intellectual life is bound up with the function and development of the brain, so is the vegetative life with the function and development of the organs serving metabolic ends. The most important of these are the circulatory system, the liver, kidneys and lymph-glands, which experience an especially early development in intrauterine life. Beside these, only those organs are well developed in the newborn which are to serve the purposes of assimilation, the lungs and the great digestive tract, while the poorly developed skeleton and the muscles only form a thin and tender covering to these essential organs. After the great increase in the size of the body during the first year of life comes the period of skeletal development which in the fifth or sixth year is joined by that of the building up of the muscular and mental powers. *Childhood* divides itself thus, as this short sketch shows, into a series of *phases or periods characterized physiologically by the development of definite organ systems*. Their separation is not only justifiable from a scientific, but in a higher degree, even from a practical standpoint, for the conditions and necessities of life are so different for each of these periods, that the kind of care and treatment is almost exclusively determined by this, that is, by the age of the individual. With the backwardness of development and the slighter variability of life conditions due to this is connected the fact that the guiding of the life must be the more regular and careful the younger the individual is. Only in later years can individual differences and the influence of social conditions be more marked.

The most useful division of childhood not only for scientific but also for practical purposes has been found in the three-fold division accepted by Vierordt.

I. Childhood. Infantia.

1. Newborn period (first week of life). Characterized by the change from intra to extrauterine life and the atrophy of fetal organs; hyperemia and desquamation of the external coverings.

2. Nursing period (first year of life). Characterized by the necessity for exclusive milk diet on account of the functional weakness of the digestive tract, also a great consumption of nourishment and considerable increase in bodily size (trebling of birth weight), marked growth of the brain; all other functions remain backward.

3. Milk teeth period (second to fifth years of life).

Characterized by rapid growth and formation of the skeleton, eruption of milk teeth, learning to walk and to talk.

II. Childhood. Pueritia. (Sixth year to puberty.) Characterized by special development and exercise of the musculature, by increase of all functional activities, and by slowly progressing growth of the body. Passage of the child from the family life into social life (school). Beginning differentiation of the sexes.

III. Age of puberty (in boys from the sixteenth year, in girls of the Germanic race, from the thirteenth year on). In the latter, beginning menstruation. Awakening of sexual impulses and development of secondary sexual characteristics.

I have limited myself to giving the physiologic characteristics of these periods very briefly. On the contrary, I will try to picture more extensively their close and important relations to pathology. If we conceive of disease as the physiologic reaction and defense of the organism against the disease producing agency, it is apparent that the physiologic condition present at the time determines the kind and course of the process. As this is true for childhood in general as compared with maturity, so it is also for the different periods of growth, which depending on the degree of development, show such great physiologic differences. In the first period of life, especially, these are so great that under the influence of local conditions there has developed a further specialization within the limits of pediatrics of such physicians, hospitals and clinics as are especially concerned with the care and diseases of the nursing period. Even if I do not consider this tendency to separate as justified, still it will serve to demonstrate the great compass and variation of the study of children's diseases.

The relation of the periods of growth to pathology are based, as already stated above, on the fact that the special physiologic peculiarities of each period bring with them a similarity in the course of life, and therefore opportunities for certain diseases such as do not occur at any other time. The undeveloped condition of the organs in general helps along by causing a lessened power of resistance against all disturbances, and further, the organs while growing rapidly are disposed to diseases to an especially high degree. Finally there exists an age disposition for a small number of diseases depending partly on external causes, partly on the condition of

the tissues themselves. All these causes unite in individuals of one and the same period of growth, and give rise to the fact that in them a certain group of diseases is observed with especial frequency, which occur much more rarely or not at all in other periods. Thus each of these periods of growth has not only a physiologic, but also a no less marked pathologic physiognomy.

I.—Infantia.

1. Newborn period. Malformations, congenital and inherited diseases (lues), tumors, birth injuries (fractures, avulsions, hematomas, brain injury), disturbances in the atrophy of fetal organs (diseases of the navel), icterus neonatorum, irritation and lesions of the tender skin and mucous membranes and favored by this bacterial invasion of the body, which still lacks protective powers, local and general sepsis, gonorrheal infection.

2. Nursing period. Disturbances due to incorrect quantity or intervals of feeding, relative or absolute insufficiency of digestion of food taken, especially in artificial feeding, irritation of the intestinal mucous membrane by bacterial decomposition products, or invasion of the intestinal wall leading to chronic intoxication and atrophy of the mucosa. The rapid growth of the brain is not infrequently accompanied by over-irritability of the nervous system (tetany), eclampsia and hydrocephalus. There is also a susceptibility of the skin and mucous membrane (bronchial diseases, pneumonia) as well as a marked tendency to pyogenic diseases of all sorts; specific infections, however, occur comparatively rarely.

3. Milk teeth period. Disturbance of ossification processes (beginning already during the first year) with its results (deformities of the thorax and limbs), bronchopneumonia, etc., from rachitis. At the same time occur other dyscrasias (status lymphaticus, scrofula, anemic states). The creeping of the child on dirty floors and the tendency to put everything into its mouth in conjunction with the lack of instinct for cleanliness produces the so-called dirt infections: Numerous mouth and throat diseases, diphtheria, contagious skin diseases, helminthiasis, pertussis, even tuberculous infection of the upper respiratory or digestive tract and the consequent lymph-gland tuberculosis especially of the bronchial glands. From the latter the form of hilum phthisis peculiar to this age arises. Frequent occurrence of local and miliary tuberculosis. Defects of the intellect show

their existence by delay or failure to learn to speak and grave lesions of the brain by appearing idiocy and epilepsy. Especial frequency of acute poliomyelitis.

II. Pueritia. Entrance into school brings with it the harmful influences connected with it—scoliosis, myopia, nervous disturbances of all sorts, and manifold contact infections, among which the acute exanthemas with their sequels, nephritis, myocarditis, are by far the most important. The desire for violent exercise explains traumatic diseases, and perhaps also the greater frequency of appendicitis. Tuberculosis, especially of the glands is rarer and approaches the adult type. On the other hand a new and dangerous infectious disease appears in acute articular rheumatism with endocarditis and chorea.

III. Puberty furnishes, especially in the female sex characteristic troubles, chlorosis, hysteria, psychoses, heart diseases. Otherwise the pathologic conditions pass over into those of adult life. (Demonstration of tables).

This classification of the most common diseases of childhood is familiar to every experienced pediatricist, and by the fact that the number of diseases coming into consideration at each age is relatively limited adds considerably to the facility of diagnosis and exact appreciation. It must also be the basis of every therapeutic consideration as the medical means as well as the care of the healthy child are different for each period of growth. At introduction, however, I wish to say a few words about the treatment of diseases of childhood in general.

Even though the general principles of medical treatment in children must be the same as in adults, still the practical application of the same differs considerably according to the age of the child. For example, it is not sufficient to reduce the dose of the medicament prescribed in a given case for an adult simply according to the body-weight of the child. Rather the physiologic peculiarities of the childish organism, its intolerance for some and tolerance for other drugs, as well as the consideration of the method of dispensing suitable to childhood necessitates in almost all cases that the choice and method of dispensing in children differ in most all instances from what is usual in adults for the same indications. The physician active in children's practice must therefore make himself familiar by special study with the therapy suitable to each period of growth.

It is similar with the physical methods of treatment. These methods also, which of late are being more and

more employed, require careful adaptation to the slighter resisting power, the lack of response, of resistance, which the small patients oppose to their use. On the other hand, the smallness and transportability of the childish body, the comparatively easily overcome resistance, and the lack of anxiety from preconception, afford in many cases a desirable ease of application.

I cannot go into details in the subject of therapy. Only in general I may say that of the flood of medicaments which has in the last few years been thrown on the market by chemic industry, only a few have found a lasting place in pediatrics. The use of medicines is becoming justly more and more limited, and replaced wherever possible by physical and dietetic methods of treatment, which by long and consistent use have given brilliant results.

We may expect a really curative effect only from those measures which stimulate further, or replace the naturally powerful healing processes of the childish organism, as is strikingly done by the diphtheria anti-toxin prepared by Behring. Here the pediatricists who generally are forced to travel in the beaten tracks of internal medicine, were in a position to take the leading role in the testing and recommending of this precious agent. A second method of treatment also used in diphtheria may here be mentioned, for the introduction of which the pediatricists exclusively are to be thanked. I refer to intubation, recommended by your genial and modest countryman, O'Dwyer, which has made the bloody operation of tracheotomy superfluous in the largest number of cases.

The greatest difference between the therapeutic problems of the pediatricist and those of the internist lies in the overwhelming importance and development of prophylaxis. The word prophylaxis in this sense is to some extent synonymous with care, inasmuch as in the education of the child because of its lacking self-determination, experience, and regulating methods, care must not only satisfy its bodily needs, but also guard it from all threatening dangers. To bring this about, the experience of adults and the general rules of hygiene, however, do not suffice. It requires special individual instruction, which can only be given by a pediatricist cognizant of the laws of child development, and carried out by persons trained in them. Clinical experience and medical statistics show that nothing influences the mortality and liability to disease in childhood as much as a

carefully conducted management by experts, and in this way most, if not all sicknesses may be kept away, at least in young children. Pediatricists have always known the great importance of protecting care, prophylaxis, even if only the magnificent acquisitions of the last few decades have shown them the proper way. We will attempt to sketch in a few words the most important axioms of prophylaxis for the different periods, and at the same time to touch on some of the questions which are still unsettled.

The prophylaxis in regard to birth injuries belongs to obstetrics. Here I only wish to mention the original idea of Professor Gaertner to overcome the grave asphyxia of the newborn by the introduction of oxygen into the umbilical vein. Apart from this, the task of the pediatricist is to make the surroundings of the newborn as much like the conditions existing in utero as possible, for which purpose an incubator may occasionally be useful. The delicacy of the skin and mucous membranes requires especial care in the cleansing and clothing of the child. It is well known that most of the diseases of the mouth which occur in the first few years are caused, or at least favored by mechanical injuries. Of course, another factor, infection, must assist. The slightest lesion of the coverings, however, and the ordinary pus bacteria which are ubiquitous in man's surroundings suffice already for their occurrence. To their frequency and danger the old foundling asylum statistics and hospital reports, in which 80% to 100% of the infants admitted died, bear witness. Through the introduction of asepsis and antisepsis into the care of nurslings, a revolution of these relations and a decrease in the septic diseases which is comparable to the precaution of puerperal fever by Semmelweis has taken place.

The largest and most difficult task in this period of life, however is the nourishment. The intestinal canal of the nursing child must, in spite of the backwardness of its development, assimilate a sufficient quantity of food for the body-weight to treble itself.

This task is comparatively easily accomplished if the natural nourishment which suits the nursling's needs so wonderfully, mother's milk, is to be had. The difficulty is immeasurably increased, however, if the mother, from lack of milk or for social reasons is unable to nurse her child, a state of affairs which is more and more often met with. As the knowledge of metabolic processes, in spite of the great amount of work spent on it, is not suf-

ficiently advanced to permit the setting up of experimentally determined values, we are today, as in former times, required to keep to the model of mother's milk, and to make the cow's milk which is used in artificial feeding as much like it as possible.

The differences of percentage composition, which at first were considered to be of the greatest importance, we have learned to overcome completely by sufficient dilution and addition of proper amounts of fat and carbohydrates. On the other hand, in course of investigation, the cleft which existed in reference to the quality of the different foodstuffs, has widened. At least, this is true of the most important one of them, the albumin. This shows irremediable differences from the albumin of mother's milk, not only in its elementary composition and chemic reactions, but as it comes from a different sort of animal, also in its biologic behavior. Wassermann and Hamburger have pointed out the importance of this question in infant feeding.

The thermolabile ferment-like bodies, which are contained in mother's milk, and to the presence of which I have myself drawn attention, also belong to the group of components which differ qualitatively. These substances give the breastfed child, as they come from the blood of the mother, a part of the antitoxins and metabolic ferments contained therein, while the analogous bodies contained in raw cow's milk are of little or no value to the nursling. Therefore, it does not appear to me justified to give up for this reason the sterilization of cow's milk by heat, an acquisition which I consider one of the greatest advantages in this line, although a general tendency exists to limit the temperature and duration of the heat as much as possible, on account of the chemic changes which it causes. This is the more possible, the more cleanly the method of obtaining the milk has been, and the more carefully it has been handled before sterilization. It appears very questionable, however, whether the recently advocated addition of formalin (Behring), or the passage of electricity (Seifert), will be able to replace sterilization by heat.

An important difference between natural and artificial nourishment exists also in the method of feeding. The child at the breast receives the milk by active suckling, and (presuming feeding by its own mother) in a quantity and composition suited to its needs. The artificially-fed child has at its disposition food in unlimited quantity, and as a rule, this is poured into its digestive

tract in excessive amount, considering its digestive powers. Another practically important step in artificial feeding lies in strict limitation of the size and number of the feedings, in the determination of the amount of nourishment calculated either by the volumetric method or reckoned in calorics, in a word in the avoidance of the habitual over-feeding of the bottle baby. In spite of the large amount of work done in this direction in the last decades, we must confess that we are still far from the aim of our efforts, the discovery of a substitute for mother's milk, and that nothing can replace it, especially in children backward in development or weakened by disease. On the other hand, we can say truthfully that we have succeeded in robbing the feeding with cow's milk of a large part of the danger which previously accompanied it, so that if the power to assimilate cow's milk is present at all, artificial feeding can be carried on with confidence as to the result. Of course, its proper carrying out requires a much greater cost of time, care and pecuniary means than does breast feeding; so that the improvement in artificial feeding is of slight or no benefit to the poor people, where it is most needed. The same difficulty also exists with regard to care, cleanliness, light and air in their dwellings.

These last factors are of special importance in the period of skeletal development. Unhygienic conditions of the surroundings, insufficient ventilation, crowding together of persons, as occurs especially among poor people and in cold weather, have, as Kassowitz has shown, an undoubted influence on the origin and severity of rachitis. Considering the great frequency and insidious beginning of this disease, it is not unnecessary to mention that the severe forms and deformities of this disease may at the proper time be prevented. In a carefully regulated diet and the use of baths, air and exercise cures, and secondarily in the administration of food preparations and medicines (phosphorus, iron, arsenic), we possess powerful aids against the development of this dyscrasia, which is so frequent at this period. In view of the change of the skeleton from the infantile to the adult type, which occurs at this time, one should also try to influence this process favorably and to prevent for example the development of the dreaded paralytic thorax by suitable means. The dangers of dirt infections are to be avoided by careful avoidance of opportunity for infection, and cleanliness; eventually, also by the use of an enclosed, protective pen (Feer.) I have

reached the opinion that not a few of the cases of tuberculous meningitis, which is so frequent at this age, are to be traced to infection from dust in the dwelling.

In the second period of childhood, which is devoted to functional development, the task of the physician is on the one hand to bring the powers and abilities of the child to harmonious perfection, on the other hand, by an appropriate selection and direction of bodily exercises and by the proper arrangement of hours of work to prevent exhaustion and harm. From which side the influence of the physician must act depends on the peculiarities of the child and of its guardians, and also on the customs and usages of the country. In the Germanic and Latin countries the general striving toward a better physical development does not begin until this period, while among people under English influence this has started long before.

A new factor comes into the life of the child with the school. The modern method of teaching classes, in closed rooms and with a comparatively large number of hours of instruction is, from the hygienic standpoint, to be looked upon as a necessary evil. So much the more we must endeavor to compensate for the unavoidable harm by improving the school arrangements on the one hand, and by sufficient time for rest on the other. From many sides the principal task of the physician in this period is thought to be by rigorous isolation measures to guard the children against the acute exanthemas, which threaten them at school. I cannot agree with this point of view under all circumstances and for all the diseases of this group. Even though every appropriate measure, even prophylactic immunization should be recommended for certain diseases like diphtheria and scarlatina, this should only be done as regards the much milder measles and varicella which attack almost every one, insofar as one tries to guard the individual as far as possible from getting the disease at a time or age in which a lessened power of resistance or a tendency to complication exists. After the sixth or seventh year this is as a rule not the case, while on the contrary in adult life, measles not infrequently takes a severe course (Biedert).

The immunity acquired by passing through certain infectious diseases is an integral part of that power of resistance which man should acquire in the course of childhood. With this item is also to be classed obligatory vaccination.

Thus every period of childhood brings new and

important necessities for the carrying out of individual prophylaxis, and these might be multiplied without difficulty. The main point is the constant and careful watching over the course of the child's life during the whole, but especially during the first period of growth, the care and furthering of normal development according to the sentence "*medicus non sit magister sed minister naturae*;" therefore in detail, the taking care of those backward in development, improvement of the already developed functions, special protection of the rapidly growing organs, prevention of the tendencies to acquired or inherited diseases, protection from injurious agencies, especially infections. Disease with which the medical care generally begins, is here to a certain extent a failure of preventive care, an interruption disturbing the normal process of development. In this sense the physician to whom the child is trusted becomes the friend and indispensable adviser of the family in all matters affecting the bringing up of the child, provided they know how to appreciate the unselfish character of his work. I admit that nowadays this function of the pediatricist is employed only exceptionally and under particularly favorable conditions, and that even in the future only a limited number of families will have it accessible. But why, at the close of a century which has shown such unexpected results, should we hesitate to place individual prophylaxis, based on raising the power of resistance and avoidance of diseases, as the ideal aim of our efforts?

The picture of modern pediatrics would be incomplete if I were not to mention the efforts and results which have been seen in the realm of the protection of children. This was the more needed, as in many countries, especially the Anglo-Germanic, the care of poor, sick, and deserted children, has always been left to private benevolence, while in the Latin countries the orphan asylums cared for the neediest group of these children. Thus were founded the children's hospitals and dispensaries, based on private donations, which today are to be found in every large community. These institutions are particularly important, as they form the natural centers for the practical education and scientific work from which the clinical institutes develop.

The assistance of pediatry in the reform of orphan and reformatory asylums, in the question of school physician, in the numberless societies whose purpose is the strengthening and making healthy of growing chil-

dren (school gardens, vacation camps, seashore homes, etc.), goes without saying. It was the pediatricist who first pointed out the necessity for such institutions, and the means of redress.

The latest movement makes the care of nursing infants its aim, the shocking mortality among whom has already been mentioned. In this direction, as in the care of children in general, at least as far as governmental aid is considered, France occupies unopposed the first rank, whom Hungary now follows with praiseworthy zeal. In most other countries there are only private undertakings; homes for cripples, milk dispensaries (so-called *grottos de lait*), maternity hospitals, homes for infants. The latter serve also mostly the purposes of educating medically trained nurses. In this respect the institutions existing in the United States, among which I have become best acquainted with St. Margaret's House, in Albany, directed by Dr. Shaw, are especially worthy types.

All these institutions have been started by pediatricists, in part carried on by them, and sustained by their voluntary and gratuitous assistance. Thus it comes about that every year hundreds of thousands of persons whose financial position would otherwise not permit it enjoy the benefit of specialistic medical advice and treatment, and that the knowledge of a rational care of children which is so necessary, becomes more and more widespread among the people. The warm interest and the aid which these efforts find among all classes of people show that the usefulness and humanity of these aims are fully appreciated. The great importance of these efforts for the sustaining and strengthening of coming generations is also being more and more recognized by the public authorities.

Thus our young science may, with full justification, claim to have been successful in the great task which has fallen to it in the share of public work.