

the beginning, it will take longer to raise his tolerance for the feeding than if he had a favorable fermentative flora. In some cases one can greatly increase the milk sugar and in others not. It is necessary to find out the kind of food the patient requires. With relation to the question of years of the cases in the two groups, raised by Dr. Christian, that is in the paper, I omitted it because I did not wish to take up too much time. As far as possible, the cases were selected in corresponding years. I think the fact that the cases cover a period of ten years to some extent counterbalances the defects in this respect.

## THE INFLUENCE OF LABOR ON THE BRAIN DEVELOPMENT OF THE CHILD \*

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The possession of a healthy mind in a healthy body is the first and indispensable condition for survival in the struggle for existence. In view of the far-reaching and disastrous results of mental enfeeblement in the individual, the home and the community, it becomes the duty of the physician to investigate all possible sources of intellectual deficiency and to eliminate all etiologic factors amenable to control. The idiot by heredity, the victim of congenital variation of germ plasma or of embryonic insufficiency of internal secretions, whose brain anomaly dates back to early intra-uterine life, is beyond our help except to the extent that we may benefit him by glandular therapy and educational methods.

Conditions are altogether different in the case of a healthy, well developed child that has traveled safely through the months of fetal evolution and reached the journey's end only to be wrecked during the process of his entry into the world.

Preventable traumatism to the skull and its contents is the subject to be considered in this paper. The rescue of even a single human being from feeble-mindedness incurred through injury at birth is such an important matter that it has occupied my mind for years, ever since in my student days I witnessed an almost incredibly long protracted labor, culminating at last in the spontaneous delivery of a living child. While practically free from external blemishes, it was almost a foregone conclusion that this infantile skull harbored a bruised and congested brain, with hemorrhagic areas and extensive destruction of nerve cells which would in turn lead to arrested brain development and feeble-mindedness.

Instrumental delivery, more particularly by the obstetric forceps, has often been accused of being the cause of birth traumatism, and has undoubtedly caused serious mutilations in the hands of the unskilled; but its action can never be so prolonged or profound as the molding of the soft cranial bones in very narrow or otherwise obstructed pelvic passages.

### INJURY TO BRAIN IN DIFFICULT LABOR

Unduly prolonged or otherwise abnormal deliveries may damage the child's brain through three mechanisms: (1) direct contusion of the brain substance; (2) local congestion and rupture of intracranial vessels by the overriding parietal bones, and (3) general

congestion of the venous system caused by an obstruction of the fetal circulation and resulting in capillary rather than in diffuse meningeal hemorrhages.

Prolonged general compression of the child's skull in the birth-passages in difficult unassisted labors is one of the causes of displacement of the cranial bones and a resulting circulatory disturbance in the venous sinuses, according to Kundrat.<sup>1</sup> In a paper on Wormian bones in fontanels and their effect on child-birth, Dr. Grace Peckham Murray<sup>2</sup> called attention to the possibility of obstetric damage to the infantile cranial contents during the second stage of labor as the time of greatest pressure. Based on personal experience in three lengthy labors with three stillbirths, she points out the detrimental influence on the child in consequence of the unduly prolonged labor. ("Instruments were not used in either instance, as there was a constant expectation that the labors would terminate naturally.")

If the damage to the brain and nerve centers may be sufficient to destroy life, as in the three cases reported by this observer, it is not unreasonable to assume that other infants may survive with irreparably damaged brains. The question also arises whether these Wormian bones in fontanels, especially in the posterior fontanel, by preventing the overlapping of the sutures and normal molding of the child's head, may not contribute their share to the exposure of well developed infants to the danger of idiocy and imbecility through the prolonged compression of the skull in the birth passages.

It is a pity that surviving children born after unaided but unduly prolonged labors have never been systematically studied in their primary school work and later mental development. Equally regrettable is the lack of reliable information regarding the birth conditions of the children in institutions for the feeble-minded. As a rule, there is at best a bald statement to the effect that the birth was natural, without comments on the duration of the labor, or that it was terminated by instrumental delivery, which is often held responsible for the feeble-mindedness. In this manner a prejudice unwarranted by the actual facts is created against the obstetric forceps. Goddard<sup>3</sup> states, however, that "since many normal children are delivered by the use of instruments with more or less temporary deformity to the head but without any effect on the mentality, it is unreasonable to conclude in those cases where there is both hereditary feeble-mindedness and a history of instrumental delivery that the latter is the cause of the mental deficiency."

Obstetric clinics, at least so far as I have been able to ascertain, keep no notes on this subject, and I have therefore endeavored to collect some data from institutions for feeble-minded children. I am well aware of the imperfections of these brief statistics, and I offer my figures chiefly in the hope that they may serve to stimulate a needed interest and invite a better study of the subject both in obstetric clinics and in homes for the feeble-minded.

A study of causes of mental defect, active at time of birth in 5,000 cases (from the Pennsylvania Training School for Feeble-Minded Children at Elwyn, Pa.), shows the following results: instrumental deliv-

\* Read before the joint meeting of the Section on Obstetrics, Gynecology and Abdominal Surgery and the Section on Nervous and Mental Diseases at the Sixty-Eighth Annual Session of the American Medical Association, New York, June, 1917.

1. Kundrat: Ueber die intermeningealen Blutungen Neugeborener, Wien. klin. Wchnschr., 1890, **3**, 887.

2. Peckham, G.: Wormian Bones in Fontanelles and Their Effect in Childbirth, Med. Rec., New York, 1888, **33**, 412.

3. Goddard: Feeble-mindedness, Its Causes and Consequences, New York, 1914, 447.

ery, 134 cases (2.68 per cent.), and difficult and prolonged labor, but without instruments, seventy-five cases (1.50 per cent.).

In a total of 562 cases recorded at the training school for mentally abnormal children at Vineland, N. J., the history of an unusually difficult or extremely prolonged labor (up to three days) appears 125 times. Special mention is sometimes made of a very large infantile head or one detained for an abnormally long time in the birth passages. Careful investigation of the records results in the discovery that in fifty-four of these protracted births no instruments were employed, which is equivalent to saying that no artificial assistance of any kind was rendered. A systematic review of the clinical material in the asylums on Randall's Island was undertaken in the expectation of securing valuable data for the establishment of the claims made in this paper. Unfortunately, incompletely kept records yielded only meager results.

It appears that on Randall's Island, for example, the first attempts at record-keeping date back less than two years, namely, to August, 1915. Altogether 1,800 histories were investigated, but comparatively few furnished any information on this point; 228 cases recorded since August, 1915, contain no account of the conditions at birth; forty-one case records state that pregnancy and birth were normal, the mental disturbance developing in later childhood as the result of traumatism or infectious disease. Of 308 records which contained statements as to the conditions at the time of birth, eighty-one showed these conditions to have been unfavorable in a variety of ways. Unduly prolonged and difficult noninstrumental deliveries were noted in thirty-four instances.

Some cases taken at random are as follows: Labor occurred at term in a primipara, aged 22 years, and lasted three days; the child was born in convulsions and grew up to a life of feeble-mindedness. Another inmate, a low grade moron idiot, was born after an unassisted labor lasting forty-eight hours. Another child classed as an imbecile is stated as having been born after a very difficult labor in which neither instruments nor chloroform were used. Three cranial operations were performed without benefit and the record adds that they probably did harm.

It is evident that these meager statistics hardly permit one to draw any conclusions. They certainly show that in an appreciable number of cases long delivery did play a part in the birth of the future defective. I feel justified in saying that in more carefully kept records we might find a surprisingly large percentage of feeble-mindedness due to this cause.

#### PROTRACTED LABOR AND THE OBSTETRIC FORCEPS

Dührssen and his pupil Küntzel,<sup>4</sup> the only obstetricians who ever took up this subject, claim that an unduly prolonged and difficult birth exerts a far more injurious influence on the child's brain than the skilled application of forceps. Among 450 idiot children, four mental defectives (0.9 per cent.), were found whose idiocy was attributed to instrumental traumatism as compared to a much greater number of difficult unassisted deliveries with twenty-three cases of idiocy. Furthermore, in Küntzel's<sup>4</sup> compilation there are twenty difficult births with artificial aid, that is, 4.5 per cent. as compared to 0.9 per cent. of idiots brought into the world by means of instruments. Evi-

dently obstetric operations cannot in a general way be accused as causative factors in the production of idiocy, and the application of forceps is decidedly preferable to protracted parturition with its serious danger to the mental integrity of the child.

Whereas the obstetric literature is remarkably poor in material dealing with this important subject, a systematic review of the neurologic literature reveals a startling array of illustrative cases which in the aggregate bear eloquent witness to the necessity of bringing the truth to the attention of obstetricians. Neurologists who have investigated the relation between birth disturbances and epilepsy, for example, are induced to believe that traumatism during the act of parturition predisposes the child's brain to the development of epileptic processes, and that birth disturbances must be held responsible as preparatory causes of epilepsy in a number of the cases.

In the Bicêtre Institute in Paris, the parents of the idiotic, epileptic, and paralytic inmates are carefully interrogated in all respects with a possible bearing on the condition of the child including all the details of delivery, especially as to its length and difficulty. The example could be advantageously followed by our own hospitals. Tissier's<sup>5</sup> statistics of mentally abnormal children in this institution comprise altogether 900 cases, in 550 of which the patients were living at the time of the report; the remaining 350 cases concerned patients who had died in the same hospital since 1883. Of seventy-six idiotic children, eighteen were born asphyxiated after difficult labors, and eighteen were born after difficult labors, but not asphyxiated.

Shuttleworth and Potts,<sup>6</sup> on the basis of experience with 2,380 mentally deficient children observed at the Royal Albert and Darenth Asylum, say:

Among causes acting at birth, that to which undoubtedly most importance attaches is prolonged parturition. It has been alleged that the use of forceps is accountable for a considerable amount of cerebral injury and consequent mental impairment. So far from this being the case it would appear from the statistics [of Shuttleworth and Fletcher Beach] that protracted pressure without instrumental interference is a much more potent cause both of mental and nervous defect. It is unquestionable that the asphyxia neonatorum, so often due to protracted unassisted labor, is in some cases followed by birth palsies and enfeeblement more or less severe of the intellectual powers. It is probably accountable for not a few of the milder types of mental feebleness.

The words of Currier<sup>7</sup> must be quoted in this connection:

A large head in a small pelvis or even a normal head in a nearly normal pelvis may be retained so long that the brain will be dangerously compressed. This is not an infrequent occurrence when the uterine contractions are indefinitely suspended in connection with the uterine inertia. Such cases were far more frequent in the past than now, the labor being allowed to continue for days rather than interfere with what were supposed to be the legitimate efforts of nature. A skull which has been compressed by such prolonged incarceration may resume its proper contour after a longer or briefer period of time and give no outward evidence of injury, but it is quite probable that if the sensitive brain has undergone compression to a considerable degree for many hours, the result will be disastrous to the child, imbecility or idiocy being the consequence. Of course the effects of this injury may not

5. Tissier, P.: De l'influence de l'accouchement anormal sur le développement des troubles cérébraux de l'enfant, Thèse de Paris, 1899.

6. Shuttleworth, S. E., and Potts, W. A.: Mentally Deficient Children, Philadelphia, 1910, 88.

7. Currier, A. F.: Injuries of the Head in the New-Born, Med. News, London, 1901, 79, 161.

4. Küntzel: Ueber den Einfluss geburtshilflicher Operationen auf die geistige Entwicklung der Kinder, Inaug. Diss., Berlin, 1891.

be apparent for many months or even years. In cases of this character the effects of hemorrhage may also be disastrous, the blood escaping through an opening in the scalp or forming a tumor under the scalp or the pericranium, or effusing and coagulating within the membranes or within the substance of the brain itself. It is largely to the credit of modern obstetrics that these accidents have become less frequent, for by the advocacy of the timely use and proper application of the forceps or other suitable instrumental procedures, it has indicated the way to anticipate and obviate them while it has at the same time brought relief to the troublesome injuries to the maternal soft parts which were so common when the labor remained unassisted for several days.

To let nature take its own course is an especially risky procedure in the case of the many children with a faulty heredity. Any traumatism of the head is here especially significant, for a brain injury which might leave no trace behind it in normal children is extremely apt to induce permanent disturbances followed by idiocy or the milder degrees of mental enfeeblement (Wulff<sup>8</sup>).

Family reports collected by Volland<sup>9</sup> plainly show the occasional injurious influence of birth traumatism, for in the same family the normally born children may remain well, whereas those born after a difficult labor become epileptic.

Whereas the value attached by certain neurologists and psychiatrists to protracted labor and infantile asphyxia as etiologic factors in later manifestations of mental enfeeblement has been greatly exaggerated according to some writers (Hannes<sup>10</sup>), others on the basis of their findings emphasize that birth traumatism possesses an undeniable importance in this respect, and that there are cases of idiocy in which no other etiologic factor is left but an abnormal delivery (Klotz<sup>11</sup>). Still other writers concede the possibility of irreparable damage to the brain through birth traumatism, without regarding this danger as at all probable.

The reason the sequelae of cranial compression are recovered from in some cases but prove irreparable in others cannot be satisfactorily given at the present state of our knowledge. Strohmeyer<sup>12</sup> comments on the very frequent statements concerning prolonged parturition in the anamnesis of feeble-minded children.

Klotz<sup>11</sup> contributes a small but unobjectionable list of 144 cases in boys and girls, admitted in the course of five years to the Schwerin institute for abnormal children. "Abnormal birth" was stated in nineteen cases, including eight protracted labors and eight forceps deliveries. Three children were born asphyxiated. After strict exclusion of all cases with faulty heredity or other complicating or predisposing etiologic factors, there remained five protracted labors as alone responsible for two idiotic and three imbecile children.

Jelliffe and Peterson<sup>13</sup> point out that parturitional factors, including meningeal hemorrhage from prolonged labor, are active in about 18 per cent. of the

cases, and it is emphasized that forceps traumatism is less injurious to the infant than tedious labor.

Ziehen<sup>14</sup> regards protracted labor as an important etiologic factor in the production of cortical aphasia and retrogressive changes of the brain, as well as of certain cases of nuclear anomalies of development.

Difficult and protracted deliveries are held responsible as the cause of cerebral palsies, in many cases, by Ibrahim,<sup>15</sup> who says that although the application of forceps may have a similar effect, skilled instrumental assistance undoubtedly prevents rather than produces the hemorrhage in most of the cases, the circumstances which have led to the application of the forceps being usually responsible for the origin of the trouble.

Peterson and Fisher<sup>16</sup> place prolonged labor first in importance in the etiology of cases of infantile spastic hemiplegia occurring at birth or infancy. They say that a large proportion of children who require resuscitation become imbeciles, meningeal and capillary hemorrhage being produced by pressure in the maternal passages. They say:

It is probable from careful investigation that the use of forceps has little to do with causing these cases; but, on the contrary, its delayed employment or nonuse more often results in danger to the child.

Sachs and Peterson,<sup>17</sup> writing on cerebral palsies in early life based on an analysis of 140 cases, point out the moral to be drawn from their table of causes in the congenital cases, namely, that the forceps should be applied if necessary; or delivery hastened by other means if protracted labor can be averted:

A child's brain and skull have a wonderful power of resistance; but do not credit them with greater virtue in this respect than they really possess. The mother's life is by far the more important, but it is well to reflect that, other things being equal, she prefers a child that is neither paralyzed nor idiotic.

All degrees of mental enfeeblement, from slight imbecility to extreme idiocy, may occur in association with the cerebral palsies of young children which are not infrequently the result of birth traumatism. Sachs<sup>18</sup> concludes from the especially common occurrence of idiocy in the paraplegias (60 per cent.) as compared to hemiplegia (13 per cent.) that this congenital spastic paraplegia must be of cerebral rather than of spinal origin, and this view has been amply confirmed by later investigations. He believes that many a paralyzed and idiotic child would lead a normal existence if the child had been properly considered at the time of birth.

To delay the application of the forceps, as is the rule of many obstetricians, until the fetal heart sounds become weak or inaudible, means that irreparable damage has often already been done to the infant's brain. In the interest of the child, unduly protracted births should be terminated by judicious intervention.

One of the illustrative cases under Sachs' observation concerned a boy, aged 3½ years, the second born of a pair of twins after an extraordinarily protracted

8. Wulff: Die geistigen Entwicklungshemmungen durch Schädigung des Kopfes vor, während, und gleich nach der Geburt, Allg. Ztschr. f. Psychiat., 1893, 49, 133.

9. Volland: Geburtsstörungen und Epilepsie, Allg. Ztschr. f. Psychiat., 1906, 63, 725.

10. Hannes, W.: Zur Frage der Beziehungen zwischen asphyktischer und schwerer Geburt und nachhaltigen psychischen und nervösen Störungen, Ztschr. f. Geburtsh. u. Gynäk., 1911, 65, 689.

11. Klotz, M.: Die aetiologische Bedeutung des Geburtstraumas für die geistige und körperliche Entwicklung, Ztschr. f. d. ges. Neurol. u. Psychiat., 1914, 8, 1.

12. Strohmeyer, W.: Vorlesungen über die Psychopathologie des Kindesalters, Tübingen, 1910, 187.

13. Jelliffe, S. E., and Peterson: Idiocy, Imbecility and Feeble-mindedness, Peterson and Haines, Textbook of Legal Medicine and Toxicology, 1903, 1, 668.

14. Ziehen, T., in Bruns-Cramer-Ziehen: Handbuch der Nervenkrankheiten im Kindesalter, 1912.

15. Ibrahim: Curschmann's Lehrbuch der Nervenkrankheiten, p. 657.

16. Peterson, F., and Fisher, E. D.: Cranial Measurements in Twenty Cases of Infantile Cerebral Hemiplegia, New York Med. Jour., 1889, 49, 365.

17. Sachs, B., and Peterson: Cerebral Palsies in Early Life, Based upon an Analysis of 140 Cases, Jour. Nerv. and Ment. Dis., 1890, 15, 295.

18. Sachs, B.: Contributions to the Pathology of Infantile Cerebral Palsies, New York Med. Jour., 1891, 53, 503; Die Hirnlähmungen der Kinder, Volkmann's Samml. klin. Vortr., Nos. 46-47 (Innere Medizin No. 16), 1892, 435.

labor. Aside from spastic paraplegia the child presented an idiotic appearance and cried incessantly. Speech had never developed; the skull was small and unsymmetrical.

Another little boy with congenital spastic paraplegia came under observation when he was 1 year of age. He was born asphyxiated after the hard, dry labor (forty-eight hours) of a primipara. The mental condition so far as could be judged was deficient but not absolutely idiotic. The child did not survive the first year, and the necropsy showed absolute adherence of the pia over both hemispheres and a marked symmetrical atrophy of the frontal halves of both hemispheres. The anatomic diagnosis was clearly that of a chronic meningo-encephalitis. We cannot err in attributing this meningo-encephalitis to a very widespread effusion of the blood between the pia and the cortex at the time of birth. Protracted labor and the marked asphyxia are the clinical conditions which corroborate that view.

The statistics of Fletcher Beach<sup>19</sup> give a ratio of 27.28 per cent. to prolonged parturition as a factor in the production of idiocy. On comparing these figures with Shuttleworth's admittedly imperfect statistics on this point, we obtain a proportion of 17.5 per cent. Of these the much larger number (14.24 per cent.) are attributed to protracted pressure without instrumental interference. Only 3.31 per cent. are attributed to forceps delivery. In comparatively few of the latter, however, were injuries noted due to the use of forceps, and there is no doubt that prolonged parturition is more detrimental than delivery by forceps.

In the experience of Fletcher Beach in the Darenth Asylum for imbecile children, the use of forceps had much less influence than their disuse in the production of idiocy and imbecility, as he points out in another article. Students sent by some of the lecturers on psychologic medicine were taught by him that prolonged and difficult labor is a potent cause of imbecility and that in such conditions it is better to put on the forceps than to run the risk of prolonged compression of the head, resulting in asphyxia, paralysis and other evils. The use of forceps skilfully applied is preferable to prolonged and difficult labor. On careful inquiry it was found that of 810 cases of idiocy in which histories could be obtained, only thirty-four, or 4.3 per cent., were charged to the application of the obstetric forceps, whereas 216 cases, or 26.6 per cent., were apparently due to prolonged and difficult labor. The majority of these infants when born were not only asphyxiated but also in a helpless condition, some having lost the use of their legs, and others becoming subject to convulsions; moreover, the head was often crushed, elongated, discolored and deformed. The table of causes of idiocy and imbecility in 2,380 cases abstracted from the Royal Albert Asylum and Darenth Asylum case books include the records of prolonged parturition, that is, protracted pressure in 339 cases not including the instrumental deliveries.

According to König's<sup>20</sup> investigations of the etiology of simple idiocy based on 260 cases, difficult birth with or without asphyxia of the child was noted in thirty-nine cases (5 per cent.), thirty-four of which were spontaneous labors without instrumental assis-

tance. In seventeen of these cases, difficult labor and asphyxia could be assumed with a fair degree of certainty as the true and only etiologic factor, and it is suggestive that in not a single instance could difficult labor be excluded as a cooperative factor.

In France, Wallich<sup>21</sup> was enabled to trace the meningeal lesions of new-born children to traumatism in twenty of thirty-two cases in which examination was made. Babonneix<sup>22</sup> repeatedly observed intellectual disturbances in the form of backwardness, imbecility and idiocy as the result of birth traumatism both in instrumental and in natural but unduly prolonged labors. He emphasizes the necessity of childbirth taking place under as easy and nearly normal conditions as possible, especially in the interest of the child's intelligence.

In this country, Reichard<sup>23</sup> emphasized nearly twenty years ago that the infantile cerebral membranes and tissues are in far greater danger from prolonged and unassisted labor than from any pressure which may be applied to the head by the proper use of the forceps. He maintains that vastly more damage is done to the structures involved in mental and nervous processes by injudicious and incapable delay than by the timely and proper use of the forceps.

Some writers, as Sander<sup>24</sup> and Langdon Down,<sup>25</sup> go so far as to deny altogether an injurious influence of the obstetric forceps when skilfully handled. In contradistinction to the small number of idiots born in countless forceps deliveries, an incomparably larger number of children actually owe their rescue from the dreary fate of the idiot precisely to the judicious application of the obstetric forceps.

Granting that the most salient causative factors in the production of idiocy are prenatal influences exerted on the fertilized ovum and the embryo, it is apparent that we are powerless to modify the processes of ontogenesis, and it therefore becomes of double importance to preserve intact the brain which has been normally developed to the end of gestation.

Naturally primogeniture plays a part in the etiology of congenital and early acquired mental deficiency, since the labor of a primipara is often slow and difficult, thereby favoring prolonged compression of the head in the birth passages, and asphyxia.

Even in the writings of Vogt<sup>26</sup> who protests against exaggerated valuation of injurious parturitional factors as causes of idiocy, the admission is found that in seven of 471 cases of congenital and early acquired cerebral deficiency with the statement of protracted labor, the difficult birth of the child proved to be the only etiologic factor to which its condition could be charged.

We may allow some compression of the infant's head in the interest of speedy extraction, for the cranium of the new-born is so elastic that this small amount of pressure can be borne for a short while without danger of permanent damage from expert application of the blades.

Violent manipulation of obstetric instruments may lay the foundation for mental deficiency of the child,

19. Beach, Fletcher: Is Instrumental Delivery a Cause of Idiocy? *Lancet*, London, 1889, 1, 97. Tuke, Hack: Article on Idiocy, *Dictionary of Psychological Medicine*, Philadelphia, 1892.

20. König, W.: Die Aetiologie der einfachen Idiotie verglichen mit den cerebralen Kinderlähmungen, *Allg. Ztschr. f. Psychiat.*, 1904, 61, 133.

21. Wallich, N.: Recherches d'anatomie pathologique chez le nouveau né, *Ann. de gynéc. et d'obst.*, 1898, 49, 201.

22. Babonneix, L.: Les traumatismes obstétricaux dans l'étiologie des encéphalopathies infantiles, *Gaz. d. hôp.*, 1909, 82, 1601.

23. Reichard, V. M.: The Obstetrical Forceps as a Cause of Mental and Nervous Disease; A Protest, *Med. News*, 1898, 73, 199.

24. Sander, in Eulenburg: *Real-Encyclopädie der gesammten Heilkunde*, 6 and 7.

25. Down, Langdon: On Some of the Mental Affections of Childhood and of Youth, *Lettsomian Lectures*, London, 1887; *Wood's Medical and Surgical Monographs*, New York, 1891, 307.

26. Vogt-Weygandt: *Handbuch der Erforschung und Fürsorge des jugendlichen Schwachsinn*, 1, 1911.

just as prolonged compression between the unyielding walls of a narrow pelvis; but the fact is sometimes overlooked that even in children born after a natural and normal labor the head is necessarily molded (and probably suffers the limit of its tolerance) as a result of its journey through the bony canals.

Cranial compression in a contracted pelvis is enumerated among the causes of mental deficiency by Krafft-Ebing,<sup>27</sup> Samuel and other authorities. The reasons for more active obstetric intervention in tedious labors were investigated by Hofmeister<sup>28</sup> in the Würzburg clinic on the basis of a material of 168 children who died during or in consequence of the birth process. In ninety-seven cases (58 per cent.) the deaths were referable to complications which were in no way related to the bony pelvis, whereas in seventy-one cases (42 per cent.) the child's death was directly due to a contracted pelvis either alone or in combination with other complications. A moderate increase of forceps deliveries is advocated by him in the interest of the child.

The advance in the art of the obstetrician is strikingly illustrated by twentieth century studies of the internal secretions and the addition of pituitary solution to the means of artificial assistance of childbirth at our disposal. At present it is not only the proper handling of the forceps on which the up-to-date accoucheur relies for the abbreviation of tedious labor and the protection of the infantile cranium. The use of pituitary solution in small doses, that is, from 2 to 3 minims, as an adjuvant in normal labor at term, which I have advocated on the basis of personal experience in a series of cases, represents the latest achievement in practical obstetrics. It is an established fact that the action of this powerful glandular extract will often shorten by many hours the time during which the brain of the child would otherwise be exposed to a dangerous compression between the rigid bony walls of the birth passages. Less than ever, since the introduction of pituitary solution, can the indolence be condoned which formerly permitted a difficult labor to drag on for days before the necessity for interference was finally admitted. Pituitary solution in small physiologic amounts as administered to our patients is probably destined to save many a well developed infant from the dreary fate of idiocy or feeble-mindedness.

In the laudable endeavors recently inaugurated for the obtaining of "better babies," the enthusiastic workers along eugenic lines can no longer afford to overlook the threatened deterioration in the quality of the offspring through traumatism at birth.<sup>29</sup>

27. Krafft-Ebing: *Lehrbuch der Psychiatrie* Ed. 6, 1897, p. 607.

28. Hofmeister, M.: Ueber die Berechtigung einer aktiveren Richtung in der geburtshilflichen Therapie, *Ztschr. f. Geburtsh. u. Gynäk.*, 1907, 59, 205; *Centralbl. f. Gynäk.*, 1907, 31, 774.

29. In addition to the references already given, the following will be found of interest:

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Barr, Martin W.: *Mental Defectives, Their History, Treatment and Training*, Philadelphia, 1904, 115.

Bochroch, M. H.: *Birth Palsies*, *Med. News*, London, 1903, 32, 1144; *New York Med. Jour.*, 1903, 78, 546.

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Koelle: *Ursachen des Schwachsinnens*, IV Schweizer Konferenz für das Idioten Wesen, 1903.

Kowitz, H. L.: *Intrakranielle Blutungen und Pachymeningitis haemorrhagica chronica interna bei Neugeborenen und Säuglingen*, *Virchows Arch. f. path. Anat.*, 1914, 215, 233.

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Ryerson, E. W.: *Brain Injuries at Birth*, *Internat. Clin.*, 1915, Series 25, 2, 106.

Vogt, H.: *Epilepsie und Schwachsinnzustände im Kindesalter*, *Arch. f. Kinderh.*, 1908, 48, 321.

## CONCLUSIONS

1. Prolonged, unassisted labor is responsible for much avoidable, harmful compression of the infant's skull in the birth passages during the period of labor.

2. The damage sustained by the child's brain and meninges often affects intellectual growth, resulting in the production of all degrees of mental impairment, from feeble-mindedness and imbecility to absolute idiocy.

3. The connection between obstetric traumatism and nervous disease in the widest sense of the term has not received sufficient consideration in the past, on account of the nonexistence of a systematic cooperation between maternity hospitals and institutions for feeble-minded children.

4. In the interest of more efficient control of preventable idiocy, a better cooperation in the form of more detailed records of the conditions during labor and of the subsequent mental development of the children is urged.

5. A better understanding between obstetricians and neurologists will help to diminish the number of imbeciles and idiots.

6. The obstetric forceps, correctly applied, are a beneficent weapon against the abnormally prolonged passage of the child's head through the pelvic canal.

7. Pituitary solution in small doses (from 2 to 3 minims) hastens the course of labor in many cases, rendering the application of the forceps unnecessary and safeguarding the contents of the infant's skull.

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## ABSTRACT OF DISCUSSION

DR. FREDERICK PETERSON, New York: Twenty-five years ago Dr. Sachs and I made a number of studies of the infantile cerebral palsies, finding that the chief cause of palsies occurring during parturition was tedious labor with resulting intracranial hemorrhages, and laid down the dictum at the time that the application of the forceps in tedious labor did less injury than the long continued compression.

While these cases are often catalogued wholly under the heading of cerebral palsies, there are associated conditions such as epilepsy in 45 per cent. of cerebral palsies, and even more common are the three degrees of defective mind, namely, feeble-mindedness, imbecility and idiocy.

There have been studies of hemorrhages in the central nervous system in stillborn children, such as that of 130 cases by H. Spencer, showing the relative distribution of hemorrhage as follows: 4 thrombosis of longitudinal sinus; 1 intracerebral; 7 lateral ventricles; 6 limited to the base of the brain; 30 spinal canal and cord; 53 from pia and arachnoid. Of these last, 29 are bilateral, 10 over the right hemisphere only and 10 over the left hemisphere. Of course the size and depth of the clot must determine the symptoms. For instance, in one case without paralysis there was congenital epilepsy and hemianopsia; in two or three, hemianopsia associated with hemiplegia and feeble-mindedness. There is every reason to believe, as I have often said, that there are many cases of various degrees of mental impairment without either epilepsy or paralysis due to the same cause—intracranial hemorrhage due to tedious labor.

It has been said that about 18 per cent. of all cases of congenital idiocy are due to parturitional causes, chiefly tedious labor, though these statistics may be revised with further study of etiology.

DR. E. B. CRAGIN, New York: The importance of this subject can hardly be estimated. It is said that the general physician has the advantage over the obstetrician or surgeon. The general physician can put his mistakes underground. The obstetrician sees them walk about, and often they go to other members of the profession. Many an obstetrician mourns to see a child whom he has brought into the world

walking along the street showing mental impairment as the result of the delivery. What can be done during pregnancy to prevent the intracranial hemorrhage and consequent mental impairment? We have to recognize that a breech presentation is followed by more of a tendency to cerebral hemorrhage than a vertex. This means that the obstetrician must carefully study during the pregnancy the presentation of the child, and, if possible, correct it before labor. This also means that we should examine our pregnant patients through the abdomen more frequently than many do, and the accurate diagnosis thus made means a great deal for the child as well as the mother. In the second place, there must be a careful study of the mechanical factors in this mechanical problem. We must know whether the pelvic canal is large enough to let that fetal head pass through; in other words, we must know the relative size of passenger and passage. The knowledge of that is the solution of the problem. When we come to the labor itself, as has been said here, often it is not the use of the forceps, but the delay in the use of the forceps, that has caused an intracranial damage. It means that women must not be left too long in the second stage of labor. After determining that the head is too large to go through the canal, the woman should be subjected to cesarean section and the baby relieved from the danger of the long compression. Only by improved methods of obstetrics shall we meet this problem of intracranial hemorrhage. While we are at present meeting this condition, we must extend this ability by having the obstetrician of small experience so study the problem that he can estimate the relative size of the passenger and the passage and not allow a woman to go into labor who should not. Regarding the application of the forceps, there must be accurate diagnosis of the position and ability to change an occiput posterior into an occiput anterior. With these precautions and a selection of the cases for cesarean section and for the forceps, we shall improve the art of obstetrics and solve the problem which is before us today.

DR. CHARLES K. MILLS, Philadelphia: I shall confine myself to one point, that is, the explanation of the manner in which the result is brought about as regards epilepsy, mental defect, etc. Every body is familiar with instances of gross hemorrhage, but the conditions which result in these cases of cerebral traumatism during delivery of most importance are not of this kind.

Many years ago I became interested in the observations of Duret on cerebral traumatisms, and later also I published one or two papers on cerebral hemorrhage. These observations of Duret on traumatism, my own and those of others, I think, gave the key to the manner in which these conditions of mental defect, epilepsy, etc., may occur. Duret dropped his animal from a certain height. In some instances large hemorrhages took place, and in others not; but in all his experimental cases necropsies were made and certain definite conditions were found, and those conditions were similar to those which I found in my studies of cerebral hemorrhage. A case of cerebral hemorrhage and apoplexy of the usual or unusual type is one in which the brain is hit a blow from within, whereas in the case of the experimental trauma it is hit from without. I found in these cases of cerebral hemorrhage of severe and sudden type, conditions almost identical with those which were found by Duret in his observations on animals which he had subjected to experimental falls. He found what I observed, widely distributed, minute hemorrhages both in the membranes and in the cerebral substance, in certain particular locations there being more marked than elsewhere. The interesting thing is the pathogenesis of these cases. I have always thought that Duret's theory of traumatism was probably correct: that when a blow is struck on the skull from without, the results are due largely to the displacement in a peculiar way of the extraventricular and intraventricular cerebrospinal fluid. Occasionally he found examples of fracture of the floor of the fourth ventricle. The theory was that this fluid, suddenly displaced by a traumatism from within or blow from without, caused sudden extravasations by the withdrawal of the support usually afforded to the walls of the vessels.

Regarding therapeutics, I can say nothing except to endorse what has been said about the importance of concluding labor. There is not only prolonged pressure, but a series of jams and recoveries which play just the part necessary to produce these disseminated hemorrhagic foci. In regard to the examination of these brains by obstetricians, I think too much attention has been paid to large hemorrhages. Examinations should be made with elaborate care to discover all that is present in these children when death results.

DR. G. L. BRODHEAD, New York: One of the sentences in Dr. Stein's paper is open to criticism in a very friendly way, but I know his views are in accord with mine. He said that instrumental delivery can never be so prolonged or so profound as the molding which takes place in protracted labor. We all know that in many cases of contracted pelvis the child gets into the world alive only because of the prolonged molding. In his series of 562 cases at Vineland Dr. Stein mentions 125 difficult labors, in fifty-four of which no instruments were used; and his statement that the statistics in our institutions are defective is borne out in this instance. He says that in fifty-four cases no instruments were used, but we have no idea from the statistics how many breech presentations there were. We know that in breech delivery there is a mortality of from 10 to 15 per cent. Some infants die immediately; some within a week or ten days. If these institutions would only endeavor to ascertain the details of the birth records of these babies, especially when born in a city institution where complete records are obtainable, much valuable information would be obtained. Dr. Stein referred to the employment of forceps being more serious than prolonged labor. In this I do not agree, because if forceps are used as they should be, there is less danger in the operation than in a very prolonged labor. I agree with Dr. Stein in disagreeing with Dr. Harris and others that labor has no influence on the development of the child's brain. It seems to me only rational to say that if pressure causes birth palsy, we certainly may look for brain abnormalities from the same cause. If the nerves are affected, why not the sensitive brain?

Dr. Stein also brought out an important point about delaying the forceps operation until the fetal heart beat was practically inaudible. I think we cannot attribute bad results to forceps when we wait until the child is practically dead and then apply instruments.

I agree with him on the value of pituitary extract in prolonged labor. One point not mentioned was the danger of giving pituitary extract in some of the cases in a protracted second stage, with the cervix dilated and the head right at the outlet. I am sure I have lost several babies by giving pituitary extract when the head was in the pelvis ready to be extracted. Pituitary extract in some of these cases causes such a tonic contraction of the uterus that the child loses its life from asphyxia. I know that Dr. Stein believes with me that cesarean section in selected cases of pelvic contraction is attended with better results than allowing the labor to be unduly prolonged.

DR. E. D. FISHER, New York: A number of years ago I was interested in this subject and wrote a paper at that time in conjunction with Dr. Peterson, including a consideration of the hemiplegias and diplegias. An interesting point was the great destruction of the brain tissue. There was not so often a meningeal as a capillary hemorrhage or vascular disturbance in the cortex of the brain, the symptoms varying according to the area involved. The cases which came to necropsy showed very marked degeneration of the brain structure. Improvement or recovery was almost impossible with such defective conditions. My experience has been that delayed labor is more often the cause of this condition, which is a purely mechanical one, not developmental, than the application of forceps. I agree with the essayist on the importance of this subject and the desirability of an extensive and long continued investigation regarding it. Instead of talking about the protracted labor, we must state what we mean. When is it long? Is it in the first stage or second stage? That is of the utmost importance. As I understand it, the dangers are chiefly from disturbance of the circulation, with direct compression of the child. I think every obstetrician



will admit that the danger of the death of the child is very greatly dependent on the character of the uterine contractions. If the contractions are weak, labor may go on for hours and there is no danger to the child's life. As a matter of fact, most of the lengthened labors are prolonged in the first stage; the contractions are not strong enough to dilate the cervix. The question is largely a mechanical one.

DR. ALFRED B. SPALDING, San Francisco: A median episiotomy in my experience does not add to the dangers of complete laceration and does relieve the child from severe head pressure in primiparous labors. When there is pressure on the head during the perineal stage of labor, oxygen given to the child via the placenta will cause even asphyxia pallida babies quickly to turn pink and rosy. Many children can be saved from injuries due to asphyxia of the cortical centers by giving the mother oxygen under pressure while she is under the influence of an anesthetic.

DR. SAMUEL J. DRUSKIN, New York: I have seen a number of cases of fractured skull in prolonged labors with mechanical deliveries. Under the use of pituitary extract I have seen in the first twenty-four hours some cyanosis in the child, with a mottled appearance of the skin and an eruption somewhat like urticaria. Although these conditions disappear, whether there is a degree of permanent impairment I do not know. I have recommended pituitary extract for a number of years. It is necessary, however, to call attention to some of these incidents.

DR. HUGH T. PATRICK, Chicago: I am glad to know that obstetricians may anticipate these difficult and dangerous labors and thus avoid birth palsies. I would emphasize the fact that a large proportion of these palsies occur in first-born. That is to say, these are the cases in which investigation of the pelvis and the position of the child is of the greatest importance. Another point not yet mentioned is the considerable number of these cases in the prematurely born; that is to say, the child is small and no difficulty is anticipated. I presume that in these children the brain and blood vessels are much more delicate and friable than in the full-term child. Consequently the greatest care should be exercised by the obstetrician. I would also suggest that the obstetrician thoroughly examine the child a few weeks after birth. I do not know how many times I have heard my obstetric friends congratulate themselves and each other after a difficult obstetric procedure that they had a living mother and a living child, it never having seemed to occur to them that this living child might be a very defective child. Now in the case in which the obstetrician congratulates himself on having brought a living child into the world, he should watch that child, or, what is perhaps better, get a competent neurologist to do it. He should be the first to discover the bad effects of the delivery. If, as has been said by one of the leading obstetricians here, occasionally the best of them lose a child, what is a fair proportion between the dead babies and the injured heads of the living babies? I do not know; I presume nobody knows. I should say, however, that for every dead child an obstetrician gets, he gets three with an injured brain. These are the children he ought to know about before the labor begins. Idiocy or imbecility without paralysis is very rarely due to birth injury.

DR. M. ALLEN STARR, New York: Like Dr. Patrick, I have been defending obstetricians all my life and trying to relieve them of the responsibilities of these idiocies and palsies. I would call attention to the fact not brought out that in an analysis of 100 necropsies on idiots, only from 19 to 20 per cent. were really due to hemorrhage in the brain. There are defective conditions of development in the brain—porencephalia, atrophy, and various conditions covering 80 per cent. of the cases of idiocy. Therefore, it seems to me that we cannot in this large number of cases blame the obstetrician, and that we can relieve the self-reproach of the mother by assuring her that in a given case the chances are that the condition of the child is not due to her contracted pelvis, and that is a psychologic element which should not be ignored for the comfort of the mother.

DR. MAX ROSENTHAL, New York: It has always seemed to me that obstetricians might do for this complication what

they have done for ophthalmia neonatorum. We all know that idiocy and spastic conditions follow birth palsies. I do not think we realize, however, how often epilepsy and brain disturbance late in life are the result of a slight injury at birth, a vascular injury occurring perhaps in the silent area of the brain yet which makes itself felt by development of idiocy or of paralysis. We must not forget that the brain at birth is in a developmental period. A great deal of the cellular and glandular development takes place after birth. Therefore, if injury occurs there it not only jeopardizes what is there, but also the possibility of future development. Furthermore, I think that some mention should be made of Dr. Cushing's effort to operate for the hemorrhages in birth palsies. There are not many cases on record but we should all bear the subject in mind, especially the obstetrician. I never see these cases until two or three weeks or a month after injury, when it is too late to consider operation for relief of the clot. Obstetricians should realize the possibility of operation in these severe hemorrhages of the new-born.

DR. ADOLF MEYER, Baltimore: It is obvious from this discussion that if we are to make any progress in the question of the influence of labor on the subsequent mental development of the child, the work will have to be done where there are good obstetric records, early collaboration between obstetrician and neurologist or psychopathologist, and adequate follow-up work. My one time teacher, Pinard, showed in a study of heredity how close the obstetrician stands to the family and to the debatable origins of early defects. An examination of the children with a record of the various types of birth stress or birth accident shortly after birth and again about the age of four or five or the early school years can alone promise dependable statistics.

DR. P. B. SALATICH, New Orleans: We tried operation on the patients with hemorrhage, but so many died that we abandoned the practice. In many cases in the first stage of labor one finds the cervix dilated but that the head remains high. Should such cases terminate normally there is still so much pressure that hemorrhage is likely to occur. If, after vaginal examination, and pressure from above, the head still will not engage, we know that it is either too large or that there is a disproportion between the pelvic brim and the head. Cesarean section should be done in such cases. I do not think we spend enough time on the careful examination of our patients. If all primiparas were examined carefully, and if we found in some cases a diminution of half an inch and advised that about the eighth month something be done, I think we would not have so much trouble at the end of the pregnancy. Of course, the patient may wish to continue the pregnancy, with the possibility of the cesarean section. Many decry pituitary extract because they do not use it in the right way. I now use it when the cervix is slow in dilating, giving 1 or 2 minims. When the cervix is dilated I give about 5 minims. When the head is down on the perineum and the pituitary extract has lost its effect, I give the patient 8 minims. If the perineum offers great resistance, I do an episiotomy. Of course it reads nicely in books, trying to hold the weight of the baby down in the last two months. In some cases you can succeed, but in about 75 per cent. the women are content to have large babies. You do not always have the truth from your patients, and you find that they will not eliminate the carbohydrates or alcohol.

DR. CHARLES R. BALL, St. Paul: I have wondered for some time why this subject has not been given more consideration. It is important to consider every measure for the prevention of these injuries, but after they occur what shall be done and how are they to be recognized in the new-born? What are the symptoms of cerebral injuries occurring during parturition? We may have perhaps a blue baby, which is hard to resuscitate, and for the few days following birth is exceedingly quiet and still. One might feel inclined to say that such a baby was a good baby because it did not cry. This condition of quietude simply means that the baby has received a serious shock and this shock is still continuing. Within a day or two, many of these babies who have received intradural and extradural hemorrhages have convulsions. It seems to me that in cases presenting such symptoms a care-

ful examination should be made to determine as nearly as possible, whether there are any symptoms of brain localization, such as paralysis, etc. If, therefore, we have a blue baby, one difficult to resuscitate, in which one side of the body seems more helpless than the other, and, particularly if there are convulsions, why is an exploratory incision not a rational procedure? Make a very small trephine opening, slit the dura and raise it up in order to see if there is any hemorrhage.

I believe that we ought to pay more attention to such symptoms as I have described in new-born babies and thus endeavor to prevent the subsequent physical, moral and mental defects which such injuries cause.

Several years ago I recommended an operation on a 3-year-old baby which did not develop intellectually or physically. It was found at the operation that along the whole side of the skull on the left side there was a regular dent, which perhaps might best be described as a greenstick fracture of the skull. Under this depression was an immense cyst pressing and flattening the brain. Had this baby been carefully examined after birth, this condition would have been recognized and remedied. I have no doubt but that there are many other symptoms of hemorrhage which will enable us to recognize it in the new-born, and when we are able better to do this why should we not apply the simple surgical principles which we apply to other conditions?

DR. HENRY P. NEWMAN, San Diego, Calif.: If this is a criticism of the obstetrician, to whom does it apply? To the man trained in his profession? No. Unfortunately obstetrics is the privilege of every licentiate in medicine, and a large percentage of the births are presided over by the pseudo-obstetrician. Consequently it would be hardly fair to ascribe to the trained professional man such faulty work. But what is the remedy? It is not the question of the use or nonuse of forceps, cesarean section, etc. It is the personal equation and the individual management of the individual case. The trained obstetrician of today studies the individual case before, during and after delivery, and his success or failure is not written in ten days or ten months, but by the ultimate welfare of both mother and child.

DR. ARTHUR STEIN, New York: Naturally, I fully agree with Dr. Brodhead about the molding of the child's head in a contracted pelvis. I agree with him also that in these cases the forceps should not be put on unless the head is low down. Regarding the use of pituitary extract, I do not agree with Dr. Druskin at all. Judiciously used it is a great help. I do not think that up-to-date obstetricians would like to do without it. We made many experiments with pituitary extract at Dr. Brodhead's division at Harlem Hospital. We standardized the method to some degree; that is, we use as little as possible, employing 2 and 3 minims at hour and hour and a half intervals, thus increasing to some degree the physiologic contraction of the uterus. With 1 c.c. we used to get tetanic contraction. I furthermore do not agree with Dr. Druskin that the drug has ill effects on the children. In the induction of labor at full term we use the small dose.

We are at a great disadvantage in the study of cases coming under the scope of my paper in not having the advice of the neurologist in the cases of babies born in big hospitals. These cases are not systematically studied from the neurologic standpoint after long or difficult labors. Therefore, I fully agree with Dr. Meyer when he says that such studies should be carried out.

## THE CUTANEOUS MANIFESTATIONS OF HODGKIN'S DISEASE: LYMPHO- GRANULOMATOSIS \*

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From a careful study of seventy cases and from a review of the literature, Ziegler,<sup>1</sup> in 1911, felt that one fourth of all cases of Hodgkin's disease, at some time or another in the course of their trouble, showed evidence of skin involvement. Bunting and Yates<sup>2</sup> quote Westphal as finding 15 per cent of his cases with skin lesions.

To me, these percentages seemed rather high until I began to go deeper into the subject and look more particularly for these manifestations. After about two years of careful observation of such cases, I feel that these writers are probably correct in their figures. It is my belief that all too frequently cutaneous lesions of lymphogranulomatosis are not noted because they have not been sought after, and it is my object to call the attention of the medical profession to this

interesting and as yet not generally recognized series of symptoms.

Osler defines this disease, first described by Hodgkin in 1832, as a "condition characterized by enlargement of the lymph-glands with progressive anemia and a fatal termination. Anatomically, there is an increase in the adenoid tissue of the glands, proliferation of the endothelial cells, formation of mononuclear and multinuclear giant cells, the presence of eosinophils and thickening of the fibrous reticulum."

The cutaneous symptoms of Hodgkin's disease may either precede,

accompany or follow after general manifestations. Ziegler says that in from 5 to 12 per cent. of the cases, the cutaneous symptoms came first. Westphal<sup>3</sup> says that in about 10 per cent. of his cases a lichen-like eruption preceded the onset. Again, the skin lesions may accompany the generalized symptoms or what is probably the most common type; they follow other signs of the systemic condition—it may be even one to two years afterward and sometimes longer.

And what, it may be asked, are the symptoms noted? Probably the commonest of these is a pruritus of

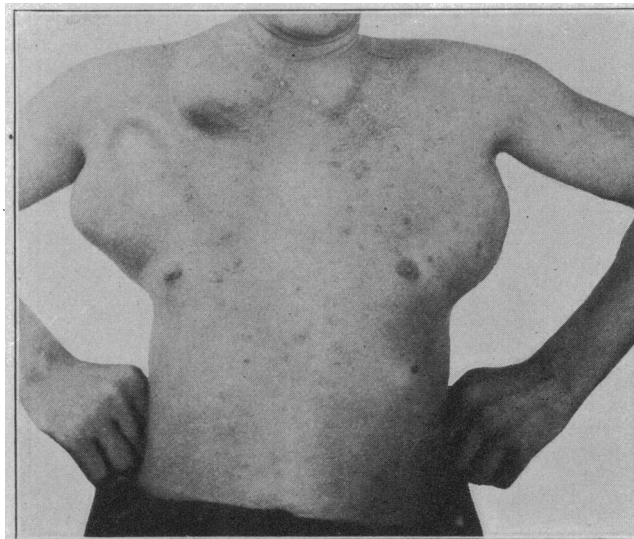


Fig. 1 (Case 6).—Prurigo-like exanthem in Hodgkin's disease; note enlarged glands.

\* Read before the Section on Dermatology at the Sixty-Eighth Annual Session of the American Medical Association, New York, June, 1917.

\* From the Departments of Dermatology and Syphilis and of Pathology, of the Western Reserve University and of the Cleveland City and Lakeside Hospitals.

\* Owing to lack of space this article has been abbreviated in THE JOURNAL by omission of some of the pictures. The complete article will appear in the transactions of the section and in the author's reprints.

1. Ziegler, Kurt: Die Hodgkinsche Krankheit, Jena, Gustav Fischer, 1911. This contains a complete review of the literature.

2. Bunting and Yates: Bull. Johns Hopkins Hosp. April, 1917, p. 151; November, 1915, p. 315.

3. Westphal, quoted by Bunting and Yates: Bull. Johns Hopkins Hosp., April, 1917, p. 151.