sects, which were flying lazily southward, paying no attention to the flowers in their way. They were not quite as numerous, however, as the Topeka report makes them out to have been. Large swarms of this species are not infrequent, being noticed from time to time.

The report also calls to mind two other instances that come under this head. One is a report of a large number of centipedes seen in Nebraska all crawling soutward (?) and noted by the author in SCIENCE some years ago. The other was the occurrence at Lincoln, Nebraska, in 1889 or 1890, of a great swarm of *Hydrophillus* (probably *triangularis*) attracted apparently by the electric lights. They were so numerous that the sound produced by their striking the electric cars resembled the rattle of large hail stones. They came in at the open windows of the cars, greatly annoying the passengers. Along the sidewalk of O Street their mashed bodies were very numerous. Possibly a bushel or more could have been swept up in the distance of a block. The occurrence of the insect in such large numbers is the more remarkable since in the vicinity of Lincoln it had not formerly been noted as a very common species, ponds and other suitable breeding places not being abundant. Yet the fact that the electric light appeared to form a factor in the concentrated abundance of the insect seems to indicate that the gathering was probably from the country round about, though it does not preclude the possibility of a migrating swarm, due possibly to the drying-up of their natural habitats.

F. C. KENYON.

WASHINGTON, D. C., October 8, 1898.

SCIENTIFIC LITERATURE.

SOME RECENT LITERATURE ON CHILD-STUDY.

THERE are probably few terms in popular use which are more variously understood than Child-Study. In the minds of some it revives a harrowing scene wherein parents and teachers are observed plying trivial or abstruse questions to their children, or experimenting with them in other ways, in the endeavor to obtain data requested in syllabi and blanks which are being scattered broadcast over the land, having already, as one eminent person is afraid, found their way into most homes and school-rooms of the country. When these data are obtained they are hurried off to the designers of the syllabi, who tabulate them, presenting the outcome in numerical results which are supposed to constitute the propositions of a presumptive science of Child-Study. To other minds this term denotes a significant movement which has for its purpose the investigation of psychical phenomena occurring in the development of human beings, this work being conceived of as different from the analysis and description of adult consciousness. Those who regard Child-Study from this point of view see that while some of the investigations that are being made, possibly the majority of them, are valueless from a scientific standpoint, yet the heart of the thing is full of vitality and is well able to produce increasing abundance of life in the whole structure.

To those who have 'syllabi' and 'Child-Study' so strongly associated that they cannot be dissevered, this movement will be looked upon as a fad of only temporary interest and of little or no importance. Professor Baldwin, for instance, seems to estimate Child-Study in this way;* for he certainly cannot have in mind the broader reaches of the subject as concerned with the study of human ontogeny, since he would scarcely regard his own numerous contributions thereto, nor would anyone else, as of a faddish, transitory character. It seems likely that others have connected the term simply with the least important aspects, with the froth or eddyings, one might say, of the study of developmental psychology Doubtless its origin and use has led to this confusion, since it has been employed principally by those who have suddenly become infatuated with the study of children, but who have brought to the undertaking meager attainments, and scarcely any first-rate qualifications for rightly conducting the work. In this way much is being offered as contributions to science which in its elaboration has not conformed to the rules of scientific procedure. But to some investigators at least this is not an occasion for discouragement, but rather one for rejoicing and congratulation, since all science has been conceived and nour-

*See *Psychological Review*, March, '98, p. 219.

ished in its infancy in this apparently unscientific manner. When there is vast enthusiasm in new phenomena on the part of the populace large amounts of data regarding them may be obtained where otherwise it would be extremely difficult to secure them; and while there is danger of error creeping into the conclusions as a result of materials being amassed whose antecedents and accompaniments have not been properly ascertained in the recording, still this error cannot long abide the scrutiny of scientific and practical people, and it must consequently be at best short-lived.

One of the peculiarities and at the same time one of the chief difficulties characteristic o this subject of Child-Study is the diversified methods which are being pursued in obtaining data. Mr. Sully, in his Children's Ways,* has made use of a mode of studying children which will doubtless become increasingly popular. He evidently carries about him a note-book into which go many things that he hears and sees when he is in the company of childhood. Then at his leisure he classifies what he has noted, and gives the result to the reader without making any serious effort at explanation or interpretation. His purpose in this book seems to be simply to draw the attention of people to phenomena in child life which, while oppressively common one might almost say, are yet very little heeded by the average parent or teacher; for the reason, doubtless, that the things with which we are constantly in contact are apt to acquire an indifferent interest for us. We accept them as matters of course, and are then rendered incapable of seeing the great truths embodied in them. This in itself justifies such a book as Mr. Sully's—that it incites thought regarding some of the most frequent exhibitions of child-life.

The 'Ways of Children' is adapted principally for popular reading, and Mr. Sully probably had no intention of contributing very extensively to the science of human development by the things which he has written therein. And yet the scientist will find here data well classified which will be of value in elaborating certain principles of ontogenesis. The materials have the exceptional quality of being for the most part rudely concrete; they are the verbatim utterances of real children and vivid descriptions of their doings. One may get some idea of the range of the author's observations by glancing over the titles of his chapters: The Realm of Fancy; The Enchantment of Play; Attacking our Language; The Serious Searcher; First Thoughts: (*a*) The Natural World, (*b*) Self and other Mysteries; The Battle with Fears: Good and Bad in the Making; Rebel and Subject; At the Gate of the Temple; First Pencillings.

Some may, upon reading this book, feel that it deals, after all, with quite trivial affairs. For one thing, Mr. Sully does not produce tables and curves, the summaries of studies upon multitudes of children; and many in these days seem to think that the study of two or three individuals is of no great account for either practice or theory. We must have experiments by the thousands and laws in percentages. But it is interesting to speculate upon the value to science of discovering that nine hundred and seventy-five children perform in a certain way, while nine hundred and fifty of the same age and under the same conditions act differently. In the face of results like these the experimenter concludes that rather more act in a given way than otherwise; but when this conclusion is to be made the basis for a principle or system of training its work is exceedingly doubtful, to say the least. Is it not of greater value to have the product of careful daily observations upon a few children than to be continually working with such large figures? Have we not in child-study fallen victims to the general tendency to overestimate the importance of magnitude—of great numbers and large sizes?

When Mr. Sully attempts to assign motives for the activities he sees in children he is apt to raise doubts in one's mind, as perhaps might be expected. For instance, witness what he gives as his opinion respecting the reason why children love to play at rolling hoop*: "Is not the interest here due to the circumstance that the child controls a thing which in the

*Sully: Children's Ways, Being Selections from the Author's 'Studies of Childhood,' with some Additional Matter. D. Appleton & Co., N. Y.

*Page 24.

freedom of its movements suggests that it has a will of its own? This seems borne out by the following story: A little girl of five once stopped trundling her hoop and said to her mother she thought that her hoop must be alive, because 'it is so sensible; it goes where I want it to.' Perhaps the same may be said of other toys, as the kite and the sailing boat." To the writer it seems that the interest lies mainly in the great wealth of motor adjustments which this game occasions, together with the delight of accomplishing a difficult task; and if the child has any conception of will in the object it at least never rises up into explicit consciousness, even though he employ such terms as 'sensible' in describing its activities. This difference of opinion emphasizes the necessity of employing more exact methods in discovering the motive of much of the evolving mental life of the child.

All students of child-development would feel grateful to Mr. Sully if he had endeavored to find some unifying principle governing the behavior of the child mind at different stages in its progress toward maturity. It may be that there is no such unity of cause underlying the psychical activities of children, but if there is we are sorely in need of it to furnish a guide for the elaboration of an educational scheme. Our gravest affliction now seems to be that our teaching is based upon the doctrine that there is great and essential diversity in mental action, and this leads us in teaching to feel that we must have manifold methods required by the different operations of the mind and various branches of study to train different faculties. It appears very likely that there is more homogeneity in the mental activities of the child than we have been wont to think, and it would be of incalculable benefit to all who train children if they could see the underlying principles of psychical ontogenesis. It would save them from that distraction which seems everywhere apparent in those who have been studying psychology in the old way and learning about the manifold operations which seem to be more or less unrelated to one another. Mr. Sully's book leaves one with the feeling of disperseness; one is a little confused by the heterogeneity of things—the want of any unity of principle. And this feeling lends emphasis to a qustion which of itself would keep popping into the mind of the reader. Are the peculiar sayings and performances of children set down in the book due to minds little stocked with knowledge reacting upon a complex environment, or are the children living over again in some measure the ancestral record? The author does not attempt an answer; and possibly it is well that he does not here, for he might fail of his purpose of enlisting the interest of the lay reader. But it is hoped that he will address himself some time to these problems, for his psychological training should make his discussion of them of value to all students of the evolution of mind in the individual.

Mr. Taylor, in his The Study of the Child,* has produced a very different sort of book from Mr. Sully's. It is evident that he had a different purpose in mind—namely, to instruct young people regarding the proper methods of dealing with children as indicated by the results of modern scientific research. He has an eminently practical aim in view, and in estimating the worth of his work this must be kept constantly in mind. The scientific student would be apt to complain considerably of the method pursued unless he held before himself all the time its purpose, which is not to advance a science but to apply it in the most concrete way possible. It seems from the tone of the writing that the contents of the book were originally given as lectures to Mr. Taylor's students in the Normal School at Emporia, Kansas, and one is impressed that they must have been of interest and value to these teachers who have probably come to this subject with little previous acquaintance, and who have immediate practical problems in the school-room to solve.

In the main Mr. Taylor writes clearly and intelligibly for the readers he has in mind, which is not a simple task by any means; and he makes his discussion concrete by producing an abundance of apt illnstrations which have fallen within his own experience. But the writer wonders why he felt it necessary to cling so closely to the terminology and methods of classification of the older psychology. He

*Taylor: 'The Study of the Child.' New York, D. Appleton & Co.

starts off discussing the various senses, then consciousness and apperception, then attention, followed by symbolism, language, muscular or motor control, feelings, will and its functions, perception, memory, imagination, conception, judgment, reasoning, etc. The disquisition upon the senses is principally hygienic, with some consideration of the effects upon the mind of their imperfect functioning, and the importance and method of training them. One feels in this part of the book that Mr. Taylor has the child always in mind, but when he reads the chapters upon the intellect and will he is distressed to find the treatment following almost precisely the methods of adult analytic psychology. Why are these things not viewed in the light of their development, their evolution, their genesis, showing how all the various operations, if they are really different, have come to be so in the child's mind? Perhaps the author felt that for young teachers he has proceeded in the most practical way to discuss the mental operations. But if he does, the writer must certainly differ with him; for it seems that it would be of far greater value, considered alike from the point of view of clearness of appreciation and concreteness to teachers of any age or degree of experience, to see how the intellect grows in a child than to examine what it is when full formed, except as the latter aids and complements the former. A teacher has to foster and direct mind growth, and she is not concerned at all with the fully grown thing, only as it enables her to comprehend the nature of the evolving entity more truly and completely.

When one keeps in mind the purpose of the book he can understand why reference has not been made more extensively to acknowledged authorities, and, also, why the style is so largely hortatory, even possibly dogmatic. It is addressed to persons who are not interested primarily in scientific method and accuracy, but who readily accept doctrines upon authority and who need to be exhorted to observe them in their own conduct. A criticism, though, should here be offered, which is applicable to much of modern writing upon Child-Study and allied subjects; propositions are ofttimes of too universal and sweeping a character when the author cannot possibly have observed their applications in but a few instances. As an illustration of this tendency we may quote a passage which, by the way, discusses a very important matter: "Many a babe's mouth is sorely blistered by a hot gargle that the nurse, accustomed to drink boiling-hot tea three times a day, declares to be 'just warm, now dearie.' *Hot plasters and poultices are clapped on the little innocents without intelligence or mercy for the same reasons, and incalculable injury is thus done to a multitude of children.*" (The italics are added.)

Any book dealing with the practical applications of science is much more liable to arouse misgivings here and there than one which simply presents the results of scientific experiment. To fit a principle to concrete conditions is a task of more serious mien than to simply work out the principle, for in the first instance many more factors have to be thought of together and adjusted to one another. Mr. Taylor's book is to be warmly commended as illustrating and promoting a movement in the training of teachers in the normal schools which promises to be most fruitful in the near future. It is to be hoped that he will find time to give us a book on the *growth* of mind in school children, bringing to the work the results of modern experimental science, as he has done in the present volume in the treatment of the senses and other important subjects.

It seems to the writer that one of the most profitable lines of investigation, alike for a science of developmental psychology and for education, runs out in the direction of psychobiology; or, perhaps more definitely, psychophysiology. It will doubtless be generally appreciated that we must derive from physiological studies the hygienic conditions in conformity to which educational processes must occur. It seems, too, as if we were already able to say that the development of the brain and mental ontogenesis are closely correlated; and if this be true it should, in a very important way, contribute to a determination of the materials and methods of instruction at various stages in the child's education. The data regarding these matters can be supplied perhaps better by physicians than by any one

else; and The Development of the Child* by Dr. Oppenheim will be gladly welcomed not alone for its own worth, but also as practically initiating a movement which should rapidly increase in breadth and momentum. Dr. Oppenheim is evidently a physician who has given attention not only to matters physical, but in an important manner to things spiritual. His practice being largely in a children's hospital, he has had unusual opportunities for making observations upon the topics which he discusses in his book. His chapter upon Facts in the Comparative Development of the Child is exceedingly valuable, since it strongly emphasizes a thought which is slowly getting established in people's minds—that the child is in many essential particulars different from the adult, and that growth consists, in a measure at any rate, in a series of transformations or metamorphoses which if completed finally culminate in a fully formed man or woman. While the author has comparatively little to say respecting changes which are known to occur in brain growth, yet it is reasonable to infer that this organ, like the others of the body, is subject to metamorphic processes in its progress toward maturity. This chapter illustrates a sort of investigation which it is hoped will receive the attention of scientists more fully in the future—the sequence in the ontogeny of the brain. It is encouraging to observe that physiologists like Wesley Mills are realizing the importance of such researches and are already making some valuable contributions thereto.

The chapter upon the Comparative Importance of Heredity and Environment is especially valuable alike for science and for education. The key-note of the chapter seems to be that the particular line of mental development occurring in the individual is determined more largely by the factor of environment than by anything else. The child, doubtless, brings into life a predisposition in certain directions due to heredity, but unless the elements in the environment favor the nutrition of special embryonic powers these will soon atrophy. Heredity of mental attributes is not so absolute and universal a thing as we have been thinking, says the author; and the reader, even though he has formed an opinion beforehand, will, when he completes the chapter, be inclined to agree to the proposition, in a measure at least. Abundant facts are adduced to show that adequate nutrition is the great determining principle in the development alike of body and brain. The importance of this for education can scarcely be overestimated. Aside from its value for mental hygiene it shows that that element in personality which receives the best nourishment from the environment will be apt to become predominant—an important principle in determining educational values.

But when the reader reaches the discussion of The Place of the Primary School in the Development of the Child he should be prepared for a very pessimistic view of the present situation in the world. It is really oppressive to find that practically everything that is is wrong. The primary school as it exists has nothing to commend it; it violates nearly all, if not all, the principles of normal growth in childhood, because it curtails freedom, spontaneity, and enforces concentration and coordination of bodily and mental powers before nature is ready for such things. One certainly cannot but endorse most heartily the contention of the author for greater freedom to be granted the child in all his school work. But it is hard to believe that everything we have been doing is bad. It is evident that Dr. Oppenheim has not in this chapter written with the same scientific care and caution that he has elsewhere. If he is right, as he will be interpreted by those who read him, the only recourse is in a return to nature wherein the order, the system, the method of education which has grown up in the development of the race will be obliterated, and we shall be back again to an orderless and systemless condition, a kind of neo-Rousseauism. But has not order and method in education been evolved as an essential element of progress in the race? And while undoubtedly formalism has been overemphasized, yet is there not as great danger in lapsing back too far in the other direction?

The same criticism may be made of Dr. Oppenheim's writing here that has been made elsewhere in this article—the hyperbole seems to be too much in evidence. An extract will

*Oppenheim: The Development of the Child. New York, D. Appleton & Co.

illustrate: "The ordinary exercises in drawing are, beyond doubt, *useless* and *harmful*. In its best aspect it is *merely muscle-exercise*, but even as such it is, partly from its cramped and spasmodic position and movements, decidedly deficient. In almost all cases it is the *crudest sort* of *caricature* that *represents* and *portrays nothing*. *It leads to no good*, and it *develops no ability*, but, on the contrary, *elevates wrong and vicious presentments* into undue prominence. *When it is 'directed' it is, if anything, worse;* for then it receives the badge of authoritative affirmation. Unless it is the 'graphic record of of a perceived fact' it is *worse than valueless.*" (The writer has italicised.)

It is certainly a most excellent and needful thing to emphasize freedom and spontaneity in the early years of school work; but the practical question is constantly forcing itself upon educators: When shall we require coordination? How early shall all the powers of the child be concentrated upon a given task? If the author would elaborate his treatise on the primary school, going into greater detail, and base all his conclusions upon clearly evident scientific facts, it would be of incalculable benefit to education. But if matters are left in the form in which they are in this chapter it is to be feared that more distraction and discouragement than anything else will be the result.

It is cause for regret that the author is so hopeless about education as it is at present conducted. And it is not so much what he says explicity as the feeling which his words inspire. It seems as if every teacher was to be blamed for some grave error. The reading of the chapter makes one feel that Dr. Oppenheim believes in the fall of man, instead of in his constant ascendency from lower to higher things. When one gets this latter point of view, he is apt to be more sympathetic toward the failure of the race to realize in practice the highest present ideals in education or in other matters. He sees that we are eternally progressing, and when he criticises his words do not have such a sting; they do not arouse so much antagonism within one as they are otherwise liable to do.

The chapters upon The Child's Development as a Factor in Producing the Genius or the Defective and the Child as a Witness in Suits at Law are both interesting and important for education. In the first is pointed out clearly the danger of extraordinary development in some narrow channel which may produce a genius, but which is liable to bring forth an unbalanced, defective personality. In the second chapter the inability of the child to observe critically and report truthfully concerning the things and phenomena which he witnesses is convincingly discussed. The absurdity of accepting the testimony of the young child in important suits at law is a matter which has escaped the attention of people too fully in the past. The chapter upon The Place of Religion in the Development of the Child seems, for the most part, to be thoroughly reasonable and of practical value as showing how fruitless, not to say vicious, much of our religious teaching is; although it appears to the writer that the author here departs in one respect from the primary principle which he has been emphasizing throughout the book—namely, that in the training of the child we are at all times to accommodate our instruction to his stage of development and not try to force him up into the atmosphere of the adult by too rapid degrees. But Dr. Oppenheim contends that it would be better to teach the child ethics and a rational (rational to the adult, that is) notion of religion at the outset, rather than the mythological perversions which he is apt to acquire as a result of present methods. But is not an ethical view of the world the product of the highest forms of civilization? and, hence, is it not preceded in ontogenesis, as it was in phylogenesis, by a mythopeic conception of the universe? Is it not necessary, then, that the child should pass through a stage of nature-worship and animism before he can be introduced to the relatively abstruse and unintelligible propositions of Dr. Oppenheim's religion and ethics? It seems altogether likely that the only way to attain the higher reaches in this, as in other matters, is by way of the lower strata.

On the whole, this book will be of the greatest worth to education in and out of school, and it is to be hoped that it is but the forerunner of others of the same general character, presenting in comprehensible manner the physician's knowledge of the laws governing the

growth of children, and, founded thereupon, his views of the proper materials and methods of school and home instruction.

There are some intelligent people who conscientiously question the value to teachers and parents of child-study in the mass; but there is probably no one who doubts the supreme value to the instructor of any knowledge which will confer upon him a better understanding of the individual child. It is probably true that, all things being viewed together, the most practical phases of this work relate to the study of individuality, since the parent or teacher is especially concerned with the proper training of each child under her care rather than with the elaboration of a science of any kind. Consequently, a book which would in a concrete, scientific way instruct tutors in the difficult art of deciphering the essential characteristics of individual children would be exceptionally helpful in teaching. Dr. Warner's The Study of Children accomplishes this in an excellent manner, so far as what might perhaps be styled the hygiene of individuals is concerned. It is devoted almost wholly to a delineation of the modes in which defective or depleted cerebral conditions manifest themselves through bodily expressions. Of course, this does not include all of what the teacher and parent ought to know of individual children; but it certainly deals with the most important factor. One would not go far astray in saying that if an instructor could determine when his children were not in such a condition of health and vigor as to profit best by his teaching, and if he could then apply healing and restorative agencies—if an instructor could do this he would satisfactorily fulfill the most important part of his mission. The Study of Children is admirably adapted to give one the power to detect cerebral incapacities in individual children and to suggest in some measure how these may be remedied.

After an introductory chapter and one treating of the body of the child, particular attention being given herein to defects of vision, hearing and breathing, the book proceeds with a description of the architecture and function of the elements of the nervous system, leading up to a science of bodily expression wherein is pointed out, in the first place, the connection between abnormal fashioning of head and features and defective brain construction, causing some sort of deficiency or estrangement in mental action. It is possible that the author attaches too great importance to the value of physiognomy, especially as it would be employed in the hands of an unskilled person; but he is on thoroughly scientific and therefore safe ground when he shows in detail how given motor activities denote correlated cerebral processes as these relate to healthful or diseased neural conditions. The chapters upon Observing the Child; What to Look at and What to Look for; Principles of the Methods of Observing and Describing Children; Points for Observation, Indicating Faults in Body or Brain Action or a Status Below the Normal; Examination of Mental Ability and the Faults that may be Observed; and Some General Conditions in Children Described, are of the greatest worth, because of the admirably concrete way in which the methods of reading expression are delineated.

It is not too much to say that any parent or teacher, upon a careful reading of this book, will be able to deal more wisely with the children intrusted to his care; for he will learn to interpret certain outward expressions as indicative of inner depletion or defect; and he will then not make the mistake, which we know is so often committed, of trying to correct misdeeds by dealing with them as though they were due to perversions of the will instead of being the legitimate issue of disturbing physiological causes. To the writer there is no department of this activity in the study of children which seems of more importance than this which we are now considering; for the reason that education is charged with the responsibility of elevating every individual to the highest possible point of usefulness to himself, and so to society, and this may be accomplished in the case of defectives only when we can apprehend the obstacles to their progress and remove them. And then, even in normal child life, there are so many activities that really at times appear abnormal to the unpracticed eye because of the blighting effects of neural fatigue. In view of these things, then, Dr. Warner's book cannot be too

highly commended to all those who are in immediate contact with childhood in the function of director of any sort.

M. V. O'SHEA.

UNIVERSITY OF WISCONSIN.

Biomechanik, erschlossen aus dem Principe der Organogenese. ERNST MEHNERT. Jena, G. Fischer. 1898. Pp. 177. Mk. 5.

The work before us has two purposes: first, to set forth additional evidence for the 'Principe der Organogenese,' already enunciated in the author's work on 'Kainogenesis als Ausdruck differenter phylogenetischer Energieen,' 1897; and, secondly, to apply this principle to organic evolution. As one can imagine from the ground covered, the work is one of those more or less interesting webs of speculation which even some of the trained German naturalists are fond of spinning at great length.

The principle of organogenesis is thus stated by the author: The rapidity of the ontogenetic process of unfolding of an organ is proportional to the height of phylogenetic development which it has attained at the time. It uniformly increases with the elevation above, and uniformly diminishes with the relinquishment of, a once attained height of development. The meaning of this principle may be made clearer by a few examples. According to the law of recapitulation of phylogeny in ontogeny we should expect a phylogenetically older organ to appear in ontogeny before a phylogenetically younger one. Thus, the great blood vessels of the vertebrate body are doubtless phylogenetically older than the heart and we should expect them to arise before it. But, on the contrary, the heart, because it has attained a higher development than the blood vessels, unfolds in ontogeny first. Its formation has been accelerated. On the other hand, the pineal eye, which is probably derived from that of Tunicates and is, consequently, older than, or at least as old, as the paired eyes, arises in ontogeny later than the paired eyes. Its unfolding has become retarded since the organ has become degenerate. The author, whose view is pretty well limited to vertebrates, tabulates some 33 cases of similar acceleration of physiologically important organs and retardation of physiologically degenerating organs.

This principle of ontogenesis, while not entirely original with the author, is elaborated by him more than it has been heretofore, and especial attention is directed to the fact that the action of this principle nullifies many inferences concerning ancestral conditions drawn from the time of appearing, or the relative size at a given age, of particular organs. Thus it has been argued from the fact that children at birth have proportionately larger brains than adults that the relative size of the brain is diminishing in the human race. According to Mehnert's principle, however, the relatively early attainment of a great size by the human brain indicates that it is a phylogenetically progressing organ, which is certainly a more reasonable as well as a more agreeable conclusion.

Starting from this principle Mehnert now attempts to explain phylogenesis thereby. Here he takes the position of a Neo-Lamarckian in respect to the inheritance of acquired characters, while he accepts Weismann's general conception of preformation in the germ by means of determinants. Individual development proceeds under the influence of two factors. One of them consists of inherited qualities whose development is the 'unfolding of phylogenetic energies;' with this has become associated the second factor, the contribution of those cells which have been added under the special influence of the functional activity of the individual; this is the epigenetic factor. The difficulty of seeing how the acquired characters—the epigenetic factor—are inherited is surmounted in this way: Inheritance is not due merely to a certain chemical constitution of the germ plasm, but also to its physical condition. The molecules of the germ exert a formative influence over each other, much as a bar magnet does over the magnetic field. Now, the quality of this influence is modifiable by the surrounding soma, much as a piece of iron in a modern warship is affected by the distribution and varying conditions of all surrounding masses of the metal. This (chiefly physical) effect of soma upon germ may determine certain qualities in the unfolding of the germ.

And here is where the principle of organogenesis comes in. When an organ is much

used and becomes larger an effect is exerted on the germ such that the organ tends to develop to a larger size in the next generation, and this peculiarity will in later generations be developed earlier and earlier in embryonic life, becoming at the same time more stably heritable.

The work is full of interesting facts, is written in a fairly readable style and is accompanied by an extensive 'Litteraturverzeichniss' of over 11 pages. While one may question the validity of the theory and find the explanation of inheritance of acquired characters vague and unsatisfactory, still we can hardly regard such an attempt as this to draw up a new and complete theory of evolution as entirely in vain.

CHAS. B. DAVENPORT.

SCIENTIFIC JOURNALS.

American Chemical Journal, October: 'On Some Double Halides of Mercury,' by J. N. Swan. 'The Double Halides of Tin with Aniline and the Toluidines,' by R. L. Slagle. 'On Double Halides of Zinc with Aniline and the Toluidines,' by D. Base. These three papers contain the results of work carried on in the Johns Hopkins University, in the general line which has been under investigation there for a number of years. The field has been thoroughly worked over, and, as a result, many of the compounds described in the literature have been shown to be impure substances or mixtures. 'Sulphonation of the Paraffins,' by R. A. Worstall. The author has found that the sulphonic acid of these hydrocarbons can be easily formed, and he has prepared a number of these acids and their salts. 'The Formation of Hydrazides by the Action of Phenylhydrazine upon Organic Acids in the Cold,' by V. L. Leighton. 'Aliphatic Sulphonic Acids, Ethylenesulphonic Acid,' by E. P. Kohler. The recently discovered gases—'krypton, metargon, neon and coronium'—and 'fermentation without cells' are discussed in the Notes at the end of this number.

J. E. G.

SOCIETIES AND ACADEMIES.

GEOLOGICAL CONFERENCE OF HARVARD UNIVERSITY, OCTOBER 4, 1898.

AT the opening meeting of the conference general statements concerning the opportunities for advanced geological work in the vicinity of Cambridge were made by the several instructors and two papers were presented.

Dr. J. E. Wolff spoke on 'The Relation of the Granite to the Ore Deposits at Franklin Furnace, New Jersey.' The problem discussed was the relative age of the zinc ores and the granite. According to one theory the ore, granite, limestone and associated secondary minerals are all contemporaneous. While by the other the ore dates from the time the granite was intruded. Dr. Wolff recently observed the contacts between several dikes of granite and the ore body, at the nine hundred and fifty-foot level, Parker Shaft, which were in some cases parallel and in others transverse to the parallel-banded structure of the ore. The granite, in places, showed a finer grain at the contact, a contact zone of garnet and indurated ore, tending to show the intrusion of the granite into the pre-existing ore body.

Dr. R. A. Daly introduced a future illustrated paper on the Volga River, with a sketch of the Physiography of Russia. In travelling across the great basin of Russia one may find evidence of three well defined periods of denudation. The first resulted in the peneplain upon the crystalline foundation which underlies, everywhere and at no great distance from the surface, the Palæozoic and later sediments; the second culminated in Triassic time, and the third is still in progress. The last is marked by a maturely developed peneplain of constant altitude, and remarkable continuity.

J. M. BOUTWELL,
Recording Secretary pro tempore.

NEW BOOKS.

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