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THE
AMERICAN NATURALIST

A MONTHLY JOURNAL DEVOTED TO THE
NATURAL SCIENCES IN THEIR
WIDEST SENSE

REPRINT

FROM

VOL. XXXIII, No. 385. JANUARY, 1899.

BOSTON
GINN & COMPANY
The Athenæum Press
1899

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GEORGE BAUR'S LIFE AND WRITINGS.

WILLIAM MORTON WHEELER.

GEORG HERMANN CARL LUDWIG BAUR was born in Weisswasser, Bohemia, Jan. 4, 1859, into a family noted for its learning. His father and three of his father's brothers were professors in German universities. Among the latter was the theologian Gustav Baur, professor at Leipzig. George Baur's father, Franz v. Baur, was professor of forestry and director of the "Forstwissenschaftliche Versuchsanstalt" at Munich from 1878 to 1897, and rector of the university from 1895 to 1896.

The year after George Baur's birth Franz Baur, who had been chief forester ("Oberförster") of Weisswasser, left Bohemia and after a short stay in Giessen occupied a lonely "Forsthaus" between Frankfurt and Darmstadt. George Baur's earliest memories

went back to this secluded dwelling in the forest of which his father was superintending forester. Here, too, the family did not tarry. In 1864 Prof. Franz Baur accepted the chair of forestry in the Academy of Hohenheim, near Stuttgart. Here he remained till he was called to Munich in 1878. It was in Hohenheim that George Baur passed the happiest years of his childhood. He was sent to school in the spring of 1865. According to his own statement, he learned with difficulty.



GEORGE BAUR.



Memorizing, especially, was irksome to him, and in later years he often complained of the absurd pedagogical methods in vogue during his boyhood. Such time as he could spare from his lessons he passed in the woods about Hohenheim, and he has left a charming little description of himself and playmates acting Fenimore Cooper's *Mohicans*, chasing one another through the woods with bows and tomahawks. There was only a "Lateinschule" in Hohenheim, so George Baur's parents decided to send him to a "Realgymnasium" at Stuttgart. He accordingly left Hohenheim and entered on his further studies during Easter, 1873. The "Realgymnasium" had an excellent director, Dr. Dillmann, a man of whom Dr. Baur always spoke with gratitude and affection. The final examinations in the Stuttgart "Gymnasium" appear to have been very severe, for Dr. Baur has often told me that the horror of these examinations kept recurring to him in his dreams years after he had grown to manhood. These dreadful examinations, however, were successfully passed, and he left the last class of the "Gymnasium" during the autumn of 1877. During the year following he returned to Hohenheim and entered the academy with the intention of becoming a forester like his father. He became Professor Niess's assistant in geology and paleontology and soon decided to change his plans and make these subjects his life's work. In the fall of 1878 he entered the University of Munich. There he studied chemistry with Bäyer, zoology with v. Siebold, and botany with Nägeli, till he had completed the summer semester of 1880. Thereupon he went to Leipzig, and during the winter of 1880-81 and the following summer semester studied comparative anatomy with Leuckart, geology with Credner, and phylogenetics with Carus. During the autumn of 1881 he again returned to Munich to complete his university work. He studied paleontology with v. Zittel, physiology with Voit, and histology and embryology with v. Kupffer. He defended his inaugural dissertation, entitled "The Tarsus of Birds and Dinosauria, a morphological study," July 18, 1882. The *quaestio inauguralis* referred to Gegenbaur's archipterygium theory. Baur had now fully decided to follow a university career, and as the first step in this direction he became assistant in his-

tology to Professor v. Kupffer in the "Anatomisches Institut" of his alma mater. In March, 1884, he was called to New Haven to act as Professor Marsh's assistant. During the same year he married Fräulein Auguste Wachter of Munich. Dr. Baur served Professor Marsh till Feb. 1, 1890, when, owing to certain difficulties with that gentleman, he resigned his position and left Yale University. During the summer of 1890 he collected fossil reptiles and fishes in western Kansas for Professor v. Zittel. In the autumn he accepted the position of docent of comparative osteology and paleontology at Clark University, Worcester, Mass. The calm atmosphere of investigation pervading that institution allayed the excitement into which he had worked himself on leaving Yale, and having entered on a position where free and independent investigation and publication were not merely tolerated but required, he began to plan several extensive works. One of these was an elaborate monograph of the North American tortoises, to be published by the National Museum as a companion volume to Cope's *Batrachia*. Another was the investigation of the faunas and floras of oceanic islands. During the two years that Dr. Baur held his position at Clark he made great progress in both of these undertakings. In 1891, through the kindness of Mr. Salisbury of Worcester, Professor H. F. Osborn, and others interested in Clark University, he was enabled to fit out an expedition to the Galapagos Islands. Accompanied by Mr. C. F. Adams, he left in May and returned in October, after visiting nearly all the islands of the archipelago. The study of his extensive collections of the plants and animals of these islands has since occupied Dr. Baur and several zoologists and botanists both in this country and in Europe. The various reports, embodying descriptions of many new species, had been nearly all published, and just before his last illness Dr. Baur was planning a general work on the Galapagos Islands to include all the results of the expedition, together with an elaborate introductory chapter by himself. The valuable collections were recently purchased by the Tring Museum, which is undertaking a further study of the Galapagos fauna.

In 1892 Dr. Baur was called to the University of Chicago as assistant professor of comparative osteology and paleontology, and three years later was advanced to an associate professorship in the same institution. Here he bent all his energies to developing the department of which he had charge. For the purpose of increasing the paleontological collections of the university two expeditions were sent out, one to eastern Wyoming, in charge of Dr. Baur himself, and a few years later another to Texas, in charge of Dr. E. C. Case. Besides the work on the material collected on these expeditions, his turtle monograph, and the Galapagos material, Dr. Baur spent much time in working out elaborate courses of lectures on vertebrate osteology and phylogenetics. His classes were never large, owing partly to the advanced and highly specialized nature of the subjects presented and partly to his inability to express himself in a clear and attractive manner in the English language. Incessant work along so many different lines wore on his highly nervous organization. During September, 1897, his friends feared that his mental health was giving way, and he was persuaded to go abroad, in the hope that a year's sojourn with his relatives in Munich and southern Tyrol might restore him to health. His illness (general paresis) was not dispelled by the change. It was found necessary to transfer him to an asylum, where he soon succumbed, June 25, 1898. He was buried at Munich. Prof. v. Kupffer, who helped to equip the young scientist for his brief but brilliant career, placed the merited laurel wreath upon the grave. Very near Dr. Baur reposes George Ebers, who died a month later.

Such was Dr. Baur's external and uneventful life; his true inner life was one of constant and enthusiastic investigation, which is but imperfectly indicated in the list of his published works appended to this article. The hundred and forty odd papers bequeathed to science are only a prodromus of the greater things which he hoped to accomplish in the near future. Like Professor Cope, whom he greatly admired and whose successor in herpetology he had hopes of becoming, he possessed a very active mind and wide interests. That he was always busy with a number of problems simultaneously is shown by a perusal of

the list of his writings. None of his works are of considerable length, many of them are mere notices, but prolixity is not one of their faults. He often condensed much patient research, both in the laboratory and the library, into an astonishingly small space. He cannot always be excused from the fault of publishing too hastily and having subsequently to change his opinions. Nor did he always succeed in maintaining his ground against his opponents without undue emphasis and unpleasantness of expression. This unpleasantness of expression was unintentional, however; being due to a certain abruptness in the use of the English language. Most of his papers appeared in a comparatively small number of journals, many of them in the *American Naturalist* and the *Zoologischer Anzeiger*.

Dr. Baur's inaugural dissertation on the tarsus of birds and Dinosaurs is the keynote to much of his later work. It begins with a study of the developing limb skeleton of the bird and branches out into a comparative study of the limbs of the extinct Dinosaurs. The closing paragraph of the paper seems to contain the germ of his later views on the origin of variation, views which were practically identical with those of the Neo-Lamarckian school. In this paragraph he maintains that the appendages of oviparous animals are more variable than those of ovo-viviparous and viviparous forms, "as a viviparous animal which develops in the uterus, far from disturbing external influences, especially those of a mechanical nature, when born exhibits a tolerably truthful picture of its ancestors, since what it possesses at birth is inherited. An oviparous animal, on the other hand, will present a much less truthful picture of its ancestry," etc. Dr. Baur would probably have dissented from this crude view in after years, but he never altogether abandoned the assumption that variations in living organisms are traceable to the inherited effects of the environment.

Dr. Baur made the Reptilia the center of his researches in paleontology and osteology. His thorough and extensive knowledge of the diversified structure of living and fossil reptiles enabled him to arrive at very correct conclusions respecting mooted questions in the osteology of the fishes on the one hand, and the birds and mammals on the other. Dr. O. P. Hay, who

studied with Dr. Baur, has published in *Science* (July, 1898, pp. 69 and 70) a brief but excellent account of Dr. Baur's work in herpetology :

“Dr. Baur's especial interest was in the morphology of the vertebrate skeleton. Although he recognized the great value of descriptive osteology, such work alone did not satisfy the demands of his mind. Although he wrote much on vertebrate paleontology, he was the describer of few new genera and species. His constant effort was to discover the relationships of forms and the way in which they had originated. He was thus impelled to study the homologies of the various bones and to attempt to connect them with the skeletons of more primitive forms. In many of his papers we find attempts made to unravel the genealogy of groups and to base classifications on this genealogy. His views regarding the scope and the methods of comparative osteology may be learned from a lecture published in *Science*, 1890, vol. xiv, p. 281.” * * * “In studying the development of the limbs, Dr. Baur held that the Amniota which possessed more than five fingers were highly specialized forms and not primitive ones, presenting transitions from the fishes. His view is now probably very generally accepted.

“A number of his papers related to the structure and the systematic position of the leather-back turtle *Dermochelys*. He opposed strongly the views of Cope, Dollo, Boulenger, and Lydekker, that this reptile forms a suborder distinct from all other living tortoises. He regarded it as belonging to merely a highly specialized branch of the Pinnata, a group which contains our living sea turtles.

“The structure and relationships of the Mosasauridæ form the subject of several interesting papers. In opposition to Professor Cope, who maintained that these extinct reptiles bore special relationship to the snakes, Dr. Baur held that they were true lizards, closely related to the Varanidæ, but modified for adaptation to an aquatic existence. An excellent paper on the structure of the skull of the Mosasauridæ was published in the *Journal of Morphology* for 1892.

“As early as 1886 Dr. Baur wrote a paper on the homologies of the bones of the otic and temporal regions. His interest in

the subject never relaxed, and some of his latest papers were written in a discussion of the subject with Professor Cope.

“In the same year above mentioned, 1886, Dr. Baur became interested in the morphology of the vertebral column, and he published a paper of considerable length in the *Biologisches Centralblatt* of that year, stating his conclusions. He gave his adherence to the opinion of Cope, who held that the vertebral centrum in all the Amniota has developed from the pleurocentrum, an element which is found distinct in the Stegocephali. He found confirmation of his views in the vertebral axis of the Pelycosaurian reptiles, in *Sphenodon*, certain lizards, birds, and even mammals. He advocated the same views in one of his latest papers.

“In the *American Naturalist* for May, 1891, occurs an important paper by Dr. Baur on the reptiles known as the Dinosauria. In a characteristic manner he gives the history and the literature of the subject and his own conclusions. His opinion was that ‘the Dinosauria do not exist.’ He believed that this group is an unnatural one, and is made up of three special groups of archosaurian reptiles which have no close relation to one another.

“Two of Dr. Baur’s most important later efforts are probably one entitled ‘The Stegocephali,’ a phylogenetic study published in the *Anatomischer Anzeiger* for March, 1896, and one, a joint paper with Dr. E. C. Case, having the title ‘On the Morphology of the Skull of the Pelycosauria and the Origin of the Mammalia,’ and appearing in the *Anatomischer Anzeiger*, 1897, pp. 109–20. In the first-mentioned paper Dr. Baur compares the skeletal structure of the Stegocephali with that of various fishes, and comes to the conclusion that the Batrachia took their origin from the Crossopterygia, rather than from the Dipnoi. The second paper was based on the fine materials collected by Dr. Case in the Permian formation in Texas. The authors concluded, on the one hand, that the Pelycosauria are closely related to the Rhynchocephalia, and that, on the other hand, they could not have been the ancestors of mammals. The authors were inclined to regard the Gomphodontia as the ancestors of the mammals.”

Dr. Baur's interest in the more general problems of morphology, such as the origin of variations, was first keenly aroused at Clark University at a time when Weismann's essays were the subjects of much general discussion. He always remained a steadfast Neo-Lamarckian, never forsaking the position he had taken in his inaugural dissertation. A perusal of Wagner's and Eimer's works convinced him that isolation and environment are potent factors in producing variation. A previous study of the giant land tortoises of the Galapagos, in connection with his turtle monograph, and further studies on a genus of lizards (*Tropidurus*) which has produced different so-called species on the various islands of the archipelago, led him to conclusions which his subsequent visit to the islands did not modify. It was, perhaps, fitting that one born in the year of the publication of the *Origin of Species* should gain inspiration from the spot where the idea of the "Origin" was conceived. At the very outset, however, he announced a far-reaching opinion utterly at variance with Darwin's view of the origin of the Galapagos. The great English scientist believed that the Galapagos were oceanic islands that had never been connected with the mainland—a view which Alex. Agassiz has supported after renewed study of the region. Dr. Baur rejected the hypothesis of the consistency of continents and oceans and asserted that the Galapagos, like the Antilles, were formed by subsidence and not by upheaval, and that they were at one time connected with Central America through Cocos Island. This contention Dr. Baur attempted to prove by showing that each separate island has its own peculiar and harmonious fauna and flora—a condition which could hardly exist if the archipelago were of volcanic origin and had acquired its plants and animals through accidental importation by means of currents from the mainland. Dr. Baur insisted on the harmonious distribution over the various Galapagos Islands of such organisms as the giant land tortoises, the lizards of the genus *Tropidurus*, the species of *Nesomimus* and other passerine birds, and the plant known as *Euphorbia viminea*. Since there was no evidence of intermigrations between the various islands to disturb the pronounced individual character of their faunas and floras, how

could one suppose that the islands had been originally peopled from the mainland six hundred miles away? Surely, he contended, isolation of faunas and floras, produced by the gradual subsidence of a mountainous area and its conversion into islands, would be a far simpler and more adequate explanation of the facts than the Darwinian theory of upheaval. Dr. Baur's view met with derision in some quarters, but recently investigators of repute, like Günther, Ratzel, Böttger, Ortmann, and Hemsley, have cast their vote in his favor against Darwin, Wallace, A. Agassiz, Stearns, Dall, and Wolf. Ridgway, who has studied the birds, and Robinson and Greenman, who have studied the Galapagos plants collected by Dr. Baur, have taken a safe neutral ground and await further evidence before expressing an opinion.

Encouraged by the recognition of the subsidence theory, Dr. Baur began to test the faunas and floras of other islands in the Pacific in the same manner as he had tested those of the Galapagos. In his last paper in the *American Naturalist* he took up the distribution of various groups of animals (crustaceans, ants, frogs, lizards, and birds) on the Solomon and Fiji Islands, and in New Caledonia, in an endeavor to show that these islands, too, were of continental origin, contrary to prevailing opinion. He did not live to complete this paper, his last effort to break the bonds of authority and open to renewed discussion the question of the origin of island faunas and floras. The man to continue this work worthily has not yet risen among us.

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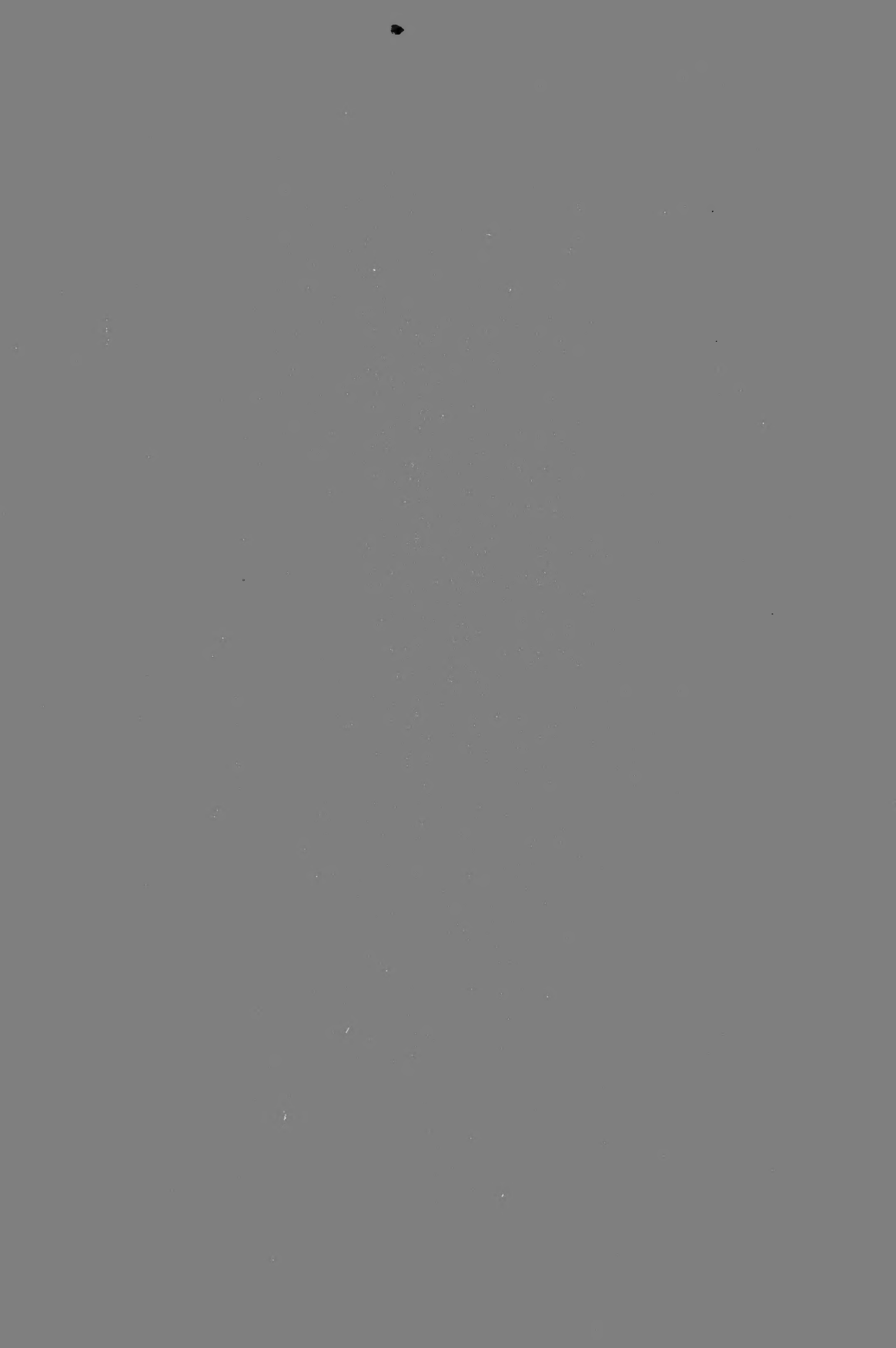
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