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CHESTER STOCK

1892—1950

A Biographical Memoir by

GEORGE GAYLORD SIMPSON

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Charles Stork

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The flavor of Chester Stock's life and the eminence of his career derive from his personal charm and from an unusually even balance of teaching, administration, and research in his profession. It is impossible to point to a unique trait and say, "This is what made him so unforgettable," or to name one phase of his work and say, "This is what made him a great paleontologist." The meaning of so broadly integrated a life is hard, perhaps impossible, to convey fully because no single aspect dominates. The problem is to portray the whole man, and even with help from many sides this is a difficult, complex task.

Ancestry and Boyhood

Although Chester's parents met and married in San Francisco, both came from Germany. John Englebert Stock was born on November 5, 1857 in Stadt-Orb, Hessen-Nassau, where his father was a well-to-do merchant. His mother, whose maiden name was Lour, was the daughter of a Bavarian forester. John Englebert emigrated to America in 1879, going first to Chicago and then in 1882 to San Francisco, where he engaged in the wholesale liquor business and died in 1914.

Maria (Johanna) Henriette Meyer, Chester's mother, was born May 6, 1860 in Geesendorf, Bremerhafen. Her grandparents on both sides were landed proprietors, in Oldenburg and in Hanover. With her family, she emigrated to New York City in 1875 and moved to San Francisco in 1884. There she married John Englebert Stock on November 9, 1885. She died in 1921.

To this couple Chester Stock was born in San Francisco on January 28, 1892. The family's circumstances were humble and they lived in the poorer section of the city. The Barbary Coast was more than a legend then and young Chester early became acquainted with the seamy side of life while roaming the streets with the other boys. Some of these companions were

rough characters and "Red" Stock was a frequent scapegoat for their deviltry. He laid the foundation for a true Horatio Alger story by selling newspapers. His usual stand was at the corner of California and Battery streets and one of the memories of a hard boyhood was of being roundly beaten up in the defense of this corner against a larger newsboy.

In spite of these tough surroundings, Chester early showed the makings of a scholar. He attended kindergarten, Starr King Primary School, Franklin Grammar School, and Polytechnic High School. Even the week-ends were busy, for on Saturday he went to gymnasium and was tutored in German and he was a regular attendant at the Lutheran Sunday school and church. On top of all this, time was found for music lessons on the tuba. The lessons were accompanied by encouraging sips of wine provided by the "professor," and the small boy used to wonder why tuba lessons made him feel a bit queer and dizzy. He played in the band of the Columbia Park Boys Club and must have acquired considerable proficiency for he later also filled professional engagements. Most remunerative of these were in the funeral processions of local bigwigs, for which the tuba player received the munificent sum (as it really was then) of $5.00.

Stock continued playing in bands at dances, excursions, and games into his sophomore year in college but then dropped music because study took all his time. In later life he sometimes expressed regrets that he had not carried his musical interests further and at one time he planned to learn to play the piano, but this, too, was dropped. J. R. Schultz recalls a session while he was a student of Stock's at which he played some Schoenberg records for Stock, who was puzzled by them. The evolution of this music from that of Beethoven and other classical composers was explained. Stock became greatly interested and drew parallels between the development of music and of vertebrate paleontology. On the whole, however, music had no abiding significance for Stock.

This was not true of some other boyhood interests, which did foreshadow his lifelong preoccupation. His father took him to the annual Mechanics Fair where he was spellbound by the

displays, especially those of mining activities. He also frequented the California Academy of Sciences, then on Market Street between Fourth and Fifth. The black-painted models of an ichthyosaur and plesiosaur struck him with never-forgotten awe and he especially mourned the loss of the mammoth when it was destroyed by fire in 1906. Great was his relief when his teacher explained that science had not suffered irrevocable damage in the loss of a creature constructed largely of two-by-fours generously padded out with hemp.

The great earthquake and fire of 1906 held more traumatic memories for the young future paleontologist. The Stock home burned and the family fled to a park high up in the city, where they camped for three weeks. Although only 14, Chester was mustered into the California National Guard during the emergency.

The elder Stocks were crushed by this experience and Chester's father apparently never fully recovered from it. Chester, himself, was left with a deep-seated fear of fire revealed in later years by his forbidding smoking above the first floor of his home and by little habits such as frequently emptying ash trays into fire-proof containers.

The effect on already shaky family finances was equally disastrous. The Stock house had been insured in a German firm which failed to pay its losses, and the elder Stock's business also received a fatal blow. Chester left high school and went to work in the Old Union Iron Works. Here his health soon broke down under the extremely hard labor and an attack of malaria. In this crisis, his mother, always a tower of strength, and his brother determined that the best hope for the studious boy was to go back to school with their aid and eventually to enter a profession. He entered Mission High School and was graduated with honors in 1910. The increasingly scientific bent of his mind is revealed by the title of his essay in the school yearbook: "Sleeping Sickness—The Tsetse Fly."

Student Days and Early Career

In the fall of 1910 Chester entered the University of California (Berkeley) with the intention of studying medicine. It is

not clear precisely how he came to transfer his ambitions from medicine to vertebrate paleontology. His brother remembers the decision as having been made reluctantly and as due to the financial burden on his family. On the other hand, in later years Chester, himself, mentioned to several colleagues that Professor John C. Merriam induced and enabled him to become a paleontologist, and he said at least once that the turning point came when Merriam sent him to Hawver Cave to collect Pleistocene mammals, an occupation with which he became fascinated. The most probable interpretation is that opportunity for earlier self-support was welcome and that Merriam provided such an opportunity and aroused interest, but that the really decisive factor for Chester, as for many other research scientists, was the discovery that he could advance scientific knowledge with his own hands and brains.

Merriam's influence on Stock was profound and it went far beyond the fact that Merriam was the means of recruiting Stock into the ranks of vertebrate paleontologists. Stock's life and work cannot be fully understood without recognition of an odd sort of intellectual symbiosis with his teacher, against which he sometimes fretted but which he recognized as important and helpful. Merriam was not always intellectually generous or fully appreciative toward Stock and it is clear that he sometimes hurt Stock deeply, yet each of them felt some measure of dependence on the other. These undercurrents did not spoil the relationship of devoted student to respected teacher.

Merriam's interests in geology and paleontology were remarkably broad, but when Stock became his student he was particularly concerned with two main subjects: the extraordinary Pleistocene mammalian fauna of Rancho La Brea (in Los Angeles, California) and the paleontology and correlation of numerous, scattered, mammal-bearing Cenozoic formations in the Great Basin and Pacific Coast regions. Stock began work on both subjects under Merriam and practically the whole of his research career was confined to these or closely related topics. His approach to them was also, and remained, like Merriam's, an excellent model.

The Hawver Cave collection, previously mentioned, was

assigned to Chester for his Ph.D. dissertation, duly published in 1918. In the meantime, however, and while Chester was still an undergraduate Merriam also turned over to him the study of one of the most striking and abundant groups in the Rancho La Brea fauna, that of the ground sloths. Stock's first published papers, three of them written before he was graduated, were on this subject. These studies eventuated in his major publication, the large memoir of 1925. This was published by the Carnegie Institution of Washington, of which Merriam was then president. The Institution continued to support and to publish much of Stock's work and that of his students through most of his career. Stock was a research associate of the Institution from 1926 to 1944.

Chester's first experience with field work gave him a lifelong enthusiasm for it. Early work in Nevada (1919) and Oregon (1920) was rugged and left many memories in the minds of Chester's companions. Something of the flavor of those expeditions may be suggested by quotation of two (among many) of R. J. Russell's anecdotes of the 1919 field season.

"The Mormons of southeastern Nevada are the most hospitable of all people. Instead of being outcasts, bums, suspicious characters, or whatever our dress and habits might indicate, we were accepted. A child would appear with a chocolate cake, jar of honey, jar of cream, or other gift, sent over by her mother. The Mormons are mild mannered, too. We established camp at the side of a ditch after several weeks without any surplus water. Here was a chance not only to get ourselves clean but also to do the accumulated laundry. Next morning a hay wagon stopped at camp. 'Boys, we would rather that you wouldn't wash your clothes in the ditch. We drink that water, and last night it was pretty soapy.' . . .

"Fossil hunting was terrible along Muddy Valley. Day after day, and in terrific heat, we would walk along the topographic complexities of the badlands, Chet on one ledge and I on another nearby. At length a prayer would be heard from Chet, a prayer of request starting with a petition for the complete skeleton of some extremely rare Tertiary mammal. In continuation it would ask for a jaw, for a tooth, for a tooth fragment, for a leg

bone, a vertebra, and eventually terminate with some such statement as, 'If Thou seest not fit to reward Thy sweating but humble servants, the lowly paleontologists who scan with care each mineral grain of Thy creation under the rays of Thy ever-shining sun, with even the astragalus of a camel, wilt Thou grant unto Thy humble supplicants the pleasure of finding at least one bone fragment, one splinter, or the tiniest chip of some animal creation which once lived, loved, and roamed in these Thy broad dominions.' "

All bone-diggers know that mood, and all know, too, that any discomfort is forgotten when a find is made and that the call of the badlands is eternal and irresistible. Chester continued throughout his life to direct an energetic collecting campaign in which he took as frequent a personal part as circumstances and other duties would permit. In common with all really successful collectors he had what can only be called a lust for fossil bones. Through personal contacts, popular writing, and lecturing he turned most of the oil geologists and many of the ranchers of the Southwest into his scouts in the search for leads to new fossil localities, leads always vigorously followed up by him or his students.

Chester was graduated with a B.S. in 1914 and received his Ph.D. in 1917. Merriam kept him on as an assistant (1917-1919) and instructor (1919-1921). In 1921 Merriam left the university and went to Washington as president of the Carnegie Institution. Stock, as assistant professor, became his successor in the teaching of vertebrate paleontology at Berkeley, a post in which he continued for five years. During this time he completed the memoir on ground sloths from Rancho La Brea, took over a monograph planned by Merriam on the sabertooths and cats of the same fossil deposit, and made numerous shorter studies of western Cenozoic mammals and their occurrences.

Later Career

While Chester was teaching at Berkeley, the California Institute of Technology, in Pasadena, was expanding its program under R. A. Millikan, and the formation of a Division of

Geological Sciences was planned. Merriam recommended J. P. Buwalda to head the proposed division and when Millikan went to Berkeley to interview Buwalda he also became deeply impressed by Stock, whom he had met casually at the Los Angeles County Museum some time before. The upshot was that both Buwalda and Stock moved to Caltech and that around them was developed one of the great geological departments of the country. Chester, then 34, was given full professional rank and continued in that capacity until his death. In 1947 he succeeded Buwalda as Chairman of the Division of Geological Sciences. The division flourished under his brief chairmanship and it is significant that the physical aspects of geology, in which he had least purely personal interest, were especially advanced.

Chester had married Clara Margaret Doud on June 2, 1921 and he took to Pasadena with him his wife and their three-year-old daughter, Jane Henriette (now Mrs. J. R. Sullivan). A son, John Chester, was born soon after the move. Mrs. Stock's death on March 20, 1934 ended a deeply-felt relationship and was one of the tragedies of Chester's life. On July 3, 1935 he re-established a happy home-life by marrying Margaret Gardner Wood, who had been associated with the administrative offices of the Institute. Their son, James Ellery, was born in 1942.

Although most of his time was devoted with great success to teaching, field work, and research at Caltech, Chester really had several related careers after moving to Pasadena. Among these, his connection with the Los Angeles Museum was second in importance only to that with Caltech. A large part of the great Rancho La Brea collections is in the Los Angeles Museum and this had brought Chester there to work during university vacations as early as 1918. After 1926 his home base was within easy reach of the Museum and he thereafter spent much time there in research and in supervision and development of paleontological and other activities. He was successively Curatorial Consultant (1931-1939), Senior Curator of Earth Sciences (1939-1948), and Chief Curator of Science (1948-1950) in the Museum.

One of Chester's consuming interests was the development

by the Museum and the county of Rancho La Brea, Hancock Park, as an attractive and instructive scientific center where prehistoric animals could be seen at one place in their original burial ground, in reconstructed skeletons, and in life-like restorations. Years were devoted to planning and preparation. Some of the landscaping was completed, a pit was dug to show bones in place, and an observation station was erected around the pit. Chester spent the afternoon before his death conferring with the director of the Museum and the architects on the next steps: completion of the landscaping and building of a museum in the park to house the Los Angeles Museum's collection of Rancho La Brea fossils. This plan is still expected to be carried out.

In 1935 Chester became particularly interested in paleontological work in Mexico, where parties under his direction worked almost continuously until the time of his death, except for a short interruption during the war. Great as was his interest in the large, important fossil collections obtained, Chester was at least equally interested in the development of friendly relationships and scientific cooperation between Mexico and the United States. This cause became a fervent crusade for him and increasingly occupied his time and attention. (His presidential address to the Geological Society of America, which would have been his most important public appearance but which he did not live to make, was to have been on this subject.) The work was done in cooperation with the Geological Institute of the National University of Mexico and the collections are being divided between that organization and the California Institute. It was planned that research and publication should eventually also be shared by the two institutes and an important paper on fossil horses by Stock's student J. F. Lance has been published in Spanish in Mexico.

Besides the positions already mentioned, Stock was visiting professor at the University of California at Los Angeles in 1939, and in 1943-1945 he held a war service appointment as senior geologist with the U. S. Geological Survey, working in the Los Angeles Basin. From 1948 until his death he also had a U.S.G.S. appointment (on a "w.a.e.," "when actually

employed," basis) and worked with D. F. Hewett on Mohave Desert Tertiary faunas.

Chester was active in the work of various scientific organizations and especially in the Geological Society of America, which he served faithfully in various capacities for years and by which he was elected president in 1950, shortly before his death. He had previously been president of both of the other two national societies including his field, the Paleontological Society in 1945 and the Society of Vertebrate Paleontology in 1947. He was also a member of the National Academy of Sciences, the American Philosophical Society, the American Academy of Arts and Sciences, the American Association of Petroleum Geologists, The American Society of Naturalists, and several other scientific and professional organizations.

Such are some of the facts of the distinguished and useful life that ended suddenly on December 7, 1950. Fuller comprehension requires some appraisal of Chester Stock as a teacher, as a research scientist, and as a person.

Teaching

"Chet's first experience teaching a class [in 1921] was painful, both to him and to the students. . . . [He] had done an immense amount of preparation but was visibly frightened and delivered his talks in a monotone that soon put each class to sleep. As he told the experience at a later date, 'It was rotten. . . . Five students asleep, completely indifferent to the complexities of the development of the mammalian dentition and but one awake, taking notes studiously. . . . Well, it may be worth while; one student is getting it. . . . Yes, one bit of fertile soil justifies planting the seeds. But on the last day I managed to peek at the one student's notebook and what did I see? He was drawing hundreds of tiny men, rows and rows of tiny men. . . .' "—So remembers R. J. Russell.

From this inauspicious beginning developed one of the most successful and best-loved teachers of paleontology. Let some of his colleagues and students bear witness:

"As a teacher, Dr. Stock possessed the enviable ability to transmit his enthusiasm for the subject to the student. By some

strange magic of voice and expression, he made it seem to us that the presence or absence of some slight structure on a fossil jaw was of vital importance even if we were not all prospective paleontologists. . . . His imparting of solid fact would be interrupted frequently by departures into a tale of some adventure associated with the finding of a particular specimen. Delightful as all this was to the student, it sometimes led to academic disaster for the story would remind Stock of something else, and that of something else. On at least one occasion, there was a long pause after the conclusion of the last story. Finally Stock muttered, 'Just where the hell was I?' . . . He believed that education was an internal process. . . . He made certain that we were grounded thoroughly in morphology and were fired by his own enthusiasm. The rest was up to us."—R. W. Wilson.

In Stock's annual lecture to a large elementary class, "the first ten or fifteen minutes were always uproarious as Chester rolled them in the aisles. . . . He told of barefooted sailors in his classes, of eyeless moles, and of not so eyeless co-eds, and always ended with an entreaty for 'you bozos' not to forget Chester Stock and Caltech after making 'your first million bucks.' From this beginning . . . Chester passed gradually into a beautifully philosophical lecture on the principles of geological history."—R. P. Sharp.

"His lecture methods were informal and effective . . . [but] he was at his best in discussion and conversation. His lectures were interspersed with amusing anecdotes of the great pioneers in paleontology. . . . He kept an extensive file of what he called 'Americana' and it was worth something to hear him read Mark Twain's theory of the origin of the fossil footprints in the Carson City prison yard."—J. R. Schultz.

"Chester's impact on the student was terrific. . . . He could spellbind a class of three or four students or an audience of hundreds with equal ease."—P. C. Henshaw.

"As a teacher, Chester was one of the most stimulating individuals on the campus. . . . His audience never knew what to expect from one moment to the next, and no one ever slept through one of his lectures. . . . By far his greatest contribu-

tions in teaching, however, were at the advanced levels. . . . He left his stamp on literally dozens of men, and in a way much more fundamental than might be expected from a man working in such a specialized field. . . . Many . . . were introduced to the techniques of research. . . . These men were taught the basic discipline of good descriptive interpretive writing. . . ." —R. H. Jahns.

It is estimated that about 1,525 students passed through Chester's classes at Caltech. Few of these majored in vertebrate paleontology and fewer still continued in that science after leaving the Institute, but all were left with a feeling, which even some hardrock geologists call "love," for the subject. J. R. Schultz adds that "in such diverse places as India, Europe, and Central America when it was found that I had studied at Caltech the question was, 'Then you must know something about vertebrate paleontology, for everyone who comes from there seems to.' "

Vertebrate paleontology is a small and not strikingly remunerative profession, so even among Chester's major students, those who wrote dissertations under him, entered some other field. Most of them are now successful geologists in industry and government service, although a few are outstanding vertebrate paleontologists, such as C. L. Gazin of the U. S. National Museum and R. W. Wilson of the University of Kansas. It cannot be said that Stock's teaching established a trend or developed a school. As a teacher he was less a trainer of specialists than an ambassador for his science, for science in general, and for intellectual curiosity and integrity.

Research

With rare exceptions, Stock restricted his own research to a narrow and unified field of specialization: the fossil mammals of western North America and the deposits in which they occur. His research approach was quite rigidly factual. He described what he saw, with as little interpretation as is consistent with the marshaling and use of facts, with no speculation, no theorizing, and no philosophizing. He devised no methods, advanced no theories, made no broad syntheses, did nothing to

change the procedures or attitudes of his science. As he, himself, once put it, "I'm after the facts and I'll let the other fellows go wrong trying to guess what they mean." Thus he was in his research, although his unpublished musings might be deeply philosophical. He had, for instance, a lifelong preoccupation, almost an obsession, for the problem of the origin of life.

At the level where he chose to work, he worked extremely well. His research papers are often masterpieces of succinct, clear, accurate, objective exposition. He added greatly to the essential basic data of paleontology and stratigraphy. His published productions include 2 large monographs and 169 shorter works, mostly technical research but including a few popular articles and summaries.

"Cenozoic Gravigrade Edentates of Western North America, with Special Reference to the Pleistocene Megalonychinae and Mylodontidae of Rancho La Brea," published in 1925, was Stock's largest independent publication. It made him the recognized authority on North American ground sloths and was so thorough that no really substantial further contribution to this subject has yet been made. (At the time of his death Stock had in hand but had not yet completed an important supplementary study on some earlier North American ground sloths.) The bulk of the monograph (154 of its 201 text pages) is devoted to painstaking anatomical description of the Rancho La Brea specimens. The scanty ground sloth specimens from elsewhere in western United States were also described, and briefer notice was given to distribution of the group, probable habits and habitats of these animals, and their classification. The whole is a model of the sort of solid study that forms the factual basis of the science of vertebrate paleontology.

Before leaving the University of California Merriam had completed several studies on parts of the Rancho La Brea fauna and had planned a large monograph on the Felidae. The felid material, even richer and more spectacular than that of the ground sloths, is especially noteworthy for the sabertooth, *Smilodon californicus,* and the giant jaguar, *Panthera atrox.* It is a result of the work of Merriam and Stock that these are among the most widely known of prehistoric animals. When Merriam

became president of the Carnegie Institution of Washington, administrative duties greatly curtailed his original research and the writing of the monograph of the Felidae was turned over to Stock. It was issued by the Carnegie Institution in 1932 as a joint publication by Merriam and Stock. In approach and style this large volume, "The Felidae of Rancho La Brea," is closely similar to Stock's ground sloth monograph: a painstaking description of the La Brea specimens, supplemented by descriptions of some similar materials from elsewhere in western United States and by remarks on distribution, habits and habitat, and classification. This publication, too, ranks as a solid, factual contribution and is the definitive work in its field.

Stock's other publications were all much briefer than his two monographs, but conjointly they bulk large and include much that was and is of basic importance. While still working on the Rancho La Brea collections, Stock (1918) described a Pleistocene mammalian fauna from Hawver Cave, in California. There was some but, as it turned out, insufficient evidence of the association of man with this fauna, and its study initiated Stock's continuing interest both in cave faunas and in early man in America. Among other studies in these fields, he described fossils from Shelter Cave, New Mexico (1930, 1932) and discussed problems of antiquity of human remains or artifacts from Los Angeles (1924), Gypsum Cave, Nevada (1931), and Clovis, New Mexico (1936). Among his few papers that review a general topic rather than describe a particular occurrence are one on Pleistocene faunal sequence as related to early man (1936) and one summarizing literature on prehistoric archaeology (1941).

Stock imbibed from Merriam and passed on to his own students an orientation more geological than prevailed among most eastern American vertebrate paleontologists, where H. F. Osborn's biological approach had stronger influence. A considerable number of Stock's papers are devoted to fragmentary fossil mammalian discoveries the interest of which is less in the fossils, themselves, than in their bearing on distributional and stratigraphic problems. Work on such materials is peculiarly demanding and their use involves the highest degree of skill in

comparative morphology. Each of these numerous studies added a specific item to the complex sequence of Cenozoic strata in the western part of the Great Basin or along the Pacific Coast. The list of formations and local faunas fitted into that sequence by Stock and his students, whom he also supervised in much work of this sort, is long: Tecuya, Siesta, Panaca, Muddy Valley, Ricardo, Puente, Titus Canyon, and others. This sort of study was begun while Stock was an instructor at Berkeley and continued throughout his life. Aside from published results, he became an authority on western Cenozoic stratigraphy and was constantly consulted on this subject by other students and by commercial geologists.

Both from a paleontological and from a geological point of view, Stock's most remarkable work after he had gone to Pasadena and had completed the Rancho La Brea monographs related to the Sespe beds, a series of varicolored continental strata some 6000 to 7000 feet in thickness in the Coast Range and the Santa Monica and Santa Ana Mountains of southern California. In twenty-five papers, from 1930 to 1938 (most of them in the Proceedings of the National Academy of Sciences), Stock described fossil mammals from the Sespe. Four distinct ages were finally represented by these finds within the Sespe, ranging from late Eocene to early Miocene. This work was of outstanding importance in several different ways.

(1) The hitherto unknown ages of the various subdivisions of this imposing pile of sediments were determined.

(2) Interfingering of the Sespe with marine sediments (Tejon to Vaqueros) permits direct correlation of the marine invertebrate and continental mammalian faunal sequences. Such correlation had previously been impossible for this part of the geologic column. Two distinct time systems are in use, one for marine and one for continental sediments, and the relationships between the two could not be directly determined before Stock's work on the Sespe, which thus marked a great advance toward solution of this crucial stratigraphic problem.

(3) Eocene mammals had previously been unknown west of the Rocky Mountain states and early to middle Oligocene mammals poorly and scantily known west of the High Plains.

The Sespe discoveries extended such knowledge hundreds of miles westward to the coast and made a major contribution to the geographic distribution of early mammals.

(4) Most of the Sespe mammals belonged to new genera or species, so that these discoveries added materially to knowledge of faunal variety and differentiation. In all, Stock described and named the following numbers of new groups from the Sespe:

Order	New genera	New subgenera	New species
Marsupialia	..	..	1
Insectivora	3	..	4
Primates	3	..	3
Rodentia	1	..	3
Carnivora	1	3	11
Condylarthra	..	..	1
Perissodactyla	1	..	4
Artiodactyla	2	2	7
Totals	11	5	34

The mammals were diagnosed in short papers each devoted to a single fossil or to a small number of related fossils, and no general listing or review of the faunas was made. Their stratigraphic significance was, however, briefly outlined in Stock's presidential address to the Society of Vertebrate Paleontology.

After the Sespe discoveries and especially during his last decade, Stock's main research interest was in the late Tertiary and Pleistocene mammals of northern Mexico. Conditions in the field did not permit his spending much time there and he was unable to complete much of the study of the extensive resulting collections, but he worked extensively on these and directed the whole program. Major excavations in high, remote San Josecito Cave, in Nuevo Leon, extended from 1935 to 1942 and produced thousands of bones of birds and mammals. Most of these were assigned to Stock's associates for study and several papers have been published on them although full lists and descriptions have not yet appeared.

At intervals from 1936 to 1950 much collecting was also done in the vicinity of Rincón and Yepomera in western Chihuahua. Here a rich mid-Pliocene fauna occurs, and here, also, thousands of bones were collected, including such novel forms as a six-horned antelope and a number of different early horses of unusual interest. Much of the preliminary preparation had been completed and a few groups had been studied by his colleagues and associates at the time of Stock's death but, again, most of the collection is a legacy for future research.

Besides the results of his technical research, Stock wrote an excellent, widely-read popular account of Rancho La Brea (1930, revised editions 1942, 1946, 1949) and, with Hildegarde Howard, a pamphlet on the evolution of the horse family (1944), both for the Los Angeles County Museum. He was also for a time a frequent contributor of short popular notes on geology and extinct animals in Westways magazine.

Stock had done much work on a textbook of paleontology which he left sufficiently advanced that D. P. Willoughby and C. W. Merriam plan to complete and publish it. All the illustrations and about two-thirds of the text of a monograph on the ground sloths of Florida were complete. Books had been planned and some text written on the geology of California and on the "Dark Mirrors," the tar pits of Rancho La Brea.

Personality

Stock was a robust, well-built man. He had sandy-red hair, which inevitably gave him a childhood nickname, and which retreated but little in middle age. His complexion was fair and became florid. He had a small mustache and wore rimless glasses over eyes usually bright with interest and humor. His hearing slowly failed over a period of years, and in the last six or seven years he wore a hearing aid, without which he was completely deaf. As a young man, in spite of one or two severe illnesses, he was highly active and vigorous. Companions of early field trips speak of his tirelessnesss. In late years high blood pressure forced some restraint, and he began to tire more easily; but he still gave an impression of ill-suppressed energy. In other respects his health was generally good, al-

though paroxysms of sneezing from hay fever occasionally evoked good-natured oaths.

The personal trait always mentioned by anyone who speaks of Chester Stock is good humor or cheerfulness. He remembered his parents as gay and fun-loving and remarked that this must have been because they were Bavarians and not stolid, serious Germans. In spite of his difficult childhood, they seem to have given this characteristic to him. His life was touched by deep sorrow more than once, but he passed on only happiness to others and had strong capacity for recovery and for enjoyment of life, profession, family, and friends. He was a sworn enemy of pomposity (as is hinted by some of the preceding comments on his teaching), and when forced into some semblance of official dignity would complain that "the bozos are trying to make a damned stuffed shirt out of me." His lack of pedantry was accompanied by an equal lack of egotism. He had no evident inferiority feelings, but he had genuine humility.

Chester worked well in organizations and smoothed administrative problems because he was ready to see other points of view and unwilling to indulge in controversy, either scientific or personal. He had a way of removing tension between others by jocular remarks inoffensive to all sides. He could be critical and had a few pet peeves against colleagues, past and current, but he never expressed criticism when or in such a way that it would damage or rankle. One of his ways to stop a controversy was to say, "I'm just a poor dumb paleontologist who doesn't know what you're talking about, but couldn't we get together and do this . . ."—and often everyone found that they could.

A faculty associate much younger than Chester (A. E. J. Engel) remarks that with him "Chester could scrutinize university policy, a research program, or a pretty girl in much the same close, happy way an old schoolmate and boyhood chum might. . . . His remarks were often punctuated with humorous, sometimes earthy analogies, or with delightfully and innocuously profane references."

In company Chester could be quiet, a courteous good listener, or could quite suddenly become the life of the party, a transi-

tion bewildering to those who did not know him well and, indeed, occasionally to those who did. He was sensitive to the mood of others, a truly social being in the best sense of the words.

Chester had few interests outside of fossils and people, the two subjects that absorbed virtually his whole attention. He avidly collected books connected with his profession. He enjoyed most of the innocent earthly pleasures, drinking with moderation and appreciating good food, especially the Spanish cuisine. He claimed no particular taste for the more abstruse music or literature, but greatly enjoyed dancing to Latin American music or reciting the poems of Bret Harte.

A candid appraisal must conclude that Chester was a good, sound, and useful scientist but not, in the usual sense, a truly great one. Yet everyone who knew him will agree that he was a great man. The paradox, if there is one, is resolved by the fact that so many whom he has left say, "I loved him."

Sources and Acknowledgments

The outpouring of materials for this account is, in itself, testimony to the affection and esteem in which Chester Stock was held. Mrs. Chester Stock has been cordially helpful. Mrs. Madeline F. Harding, Stock's secretary, provided the bibliography and obtained and compiled much other information, including most of the statements received. Information on Stock's career and personal statements of incidents and impressions were provided by A. C. Stock, Chester's brother, and by the following associates and former students: R. W. Chaney, A. E. J. Engel, P. C. Henshaw, H. Howard, R. H. Jahns, R. A. Millikan, H. H. G. Nash, R. J. Russell, J. R. Schultz, R. P. Sharp, and R. W. Wilson. I have also read all of Stock's publications and have drawn on my own prized memories of him.

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KEY TO ABBREVIATIONS

Amer. Jour. Sci. = American Journal of Science
Amer. Nat. = American Naturalist
Bull. Amer. Assoc. Petrol. Geol. = Bulletin, American Association of Petroleum Geologists
Bull. Calif. Inst. Tech. = Bulletin, California Institute of Technology
Bull. Geol. Soc. Amer. = Bulletin, Geological Society of America
Bull. S. Calif. Acad. Sci. = Bulletin, Southern California Academy of Sciences
Eng. Sci. Mo. = Engineering and Science Monthly
Jour. Geol. = Journal of Geology
Jour. Mam. = Journal of Mammalogy
Jour. Wash. Acad. Sci. = Journal, Washington Academy of Sciences
Nat. Acad. Sci. Biogr. Mem. = National Academy of Sciences Biographical Memoirs
Proc. Acad. Nat. Sci. Phila. = Proceedings, Academy of Natural Sciences of Philadelphia
Proc. Nat. Acad. Sci. = Proceedings, National Academy of Sciences
Sci. Mo. = Scientific Monthly
Soc. Vert. Paleont. = Society of Vertebrate Paleontology
Trans. San Diego Soc. Nat. Hist. = Transactions, San Diego Society of Natural History
Univ. Calif. Publ., Bull. Dept. Geol. = University of California Publications, Bulletin, Department of Geology

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