6. Of the five colors, blue, red, green, brown, white, blue and red were most attractive, and about equally so, as measured in terms of voluntary exertion in reaching for them.

7. The fact mentioned above under Paragraph 3 furnishes another item of evidence for the presence of efferent feelings of innervation. Why did the child prefer the right hand uniformly for effort, if not under the feeling of stronger outward nervous pressure in the case of that hand? Professor James, no doubt, can explain it with his "kinaesthetic memories,"—that sword with which he decapitates so many points of evidence in his "Principles of Psychology,"—but he does not succeed in convincing many of us, any more than Bastian did in the first place. If memories of former movements with effort give "the cue," then how do you know that there are no memories of "innervation" among them? But memories of movement without effort cannot give the "cue," for my child used both hands equally in movements without effort; and the motor force of such memories would be neutral as regards hand-preference. How simple the explanation from the point of view of "innervation"! Memories of effortless movement are all of efferent sensations: hence either hand responds, or both. Memories of movements with effort are the same memories plus memory of an afferent feeling of effort: hence the right hand moves, perhaps followed by the left; that is, a memory of feeling of innervation in former cases is re-enforced by the same feeling now. Perhaps Professor James or some other "afferentist" will explain this case. The child is now (thirteenth month) a confirmed right-hander, so to speak.

I have cited only points which have their own value,—points on which observations on one child are as valuable as on many,—determinations concerning the order of development of the mental functions with the physical, not determinations merely of the time of development, which may vary. Observations on single children may also be valuable as showing that an event may happen, as opposed to theories according to which such an event may not happen, under given circumstances.

J. MARK BALDWIN.

University of Toronto, Oct. 18.

Deaf-Mutes.

PROFESSOR ALEXANDER GRAHAM BELL, in a recent number of *Science* (Sept. 5) correctly quotes me as saying, "I do not discourage the intermarriages of the deaf, as they are usually more happily mated thus than where one of the parties only is deaf. The deaf need the companionship of married life more than those who hear, and it is a gross wrong to discourage it." And he adds the following statement and inquiry: "Dr. Gillett is probably the oldest teacher in America,—not oldest in years, but oldest in service,—and he is looked up to as a guide by very many in the profession. Much good might arise from a comparison of views between Dr. Gillett and those scientific gentlemen who have given most attention to the subject of heredity. May I ask him, through the columns of *Science*, what would he his advice in such a case as the following? A young man (not a deaf-mute) became deaf in childhood while attending public school. He has one brother who is a deaf-mute, and another who can hear. Two others of the family (believed to be hearing) died young. The father of this young man was born deaf in one ear, and lost the hearing of the other subsequently from illness. He had a congenitally deaf brother who married a congenital deaf-mute and had four children (three of them congenital deaf-mutes). The mother of the young man was a congenital deaf-mute, and she also had a brother born deaf. The paternal grandmother of the young man was a congenital deaf-mute, and she had a brother who was born deaf. This brother married a congenital deaf-mute, and had one son born deaf. The great-grandfather of this young man (father of his paternal grandmother) was a congenital deaf-mute; and he was, so far as known, the first deaf-mute in the family. Thus deafness has come down to this young man through four successive generations, and he now wants to marry a congenital deaf-mute. The young lady has seven hearing brothers and sisters, and there was no deafness in her ancestry, but she herself is believed hy her family to have been born deaf. Dr. Gillett must not think that this is a purely hypothetical case, for it is not. The parties are engaged, but the marriage has not yet been consummated, and I know that Dr. Gillett's advice would have weight with the young people. The teacher of the young lady has been consulted, and she feels the responsibility deeply. Her heart is with the young couple, and she desires their happiness, and yet her judgment is opposed to the union. Will Dr. Gillett tell us what his advice would be in such a case?"

My advice in such a case as this would be for the young people to examine themselves carefully as to what their motives are in contemplating matrimony. If they have no higher thought than the animal impulse, I would advise them by no means to enter into that sacred relation; but if they are already so united in heart that each is needful to the happiness of the other, I would advise them as soon as their circumstances are such as to enable them to maintain a family in comfort, whether the children should hear or be deaf, to follow the promptings of their higher nature, with a determination to rear their children to respectability and usefulness, which they can do in one case almost as effectually as in the other. Thus one happy union will certainly be effected; while, if prevented, not only would this be estopped, but probably two unhappy, because uncongenial, ones would ensue. If deafness were a crime, or a disgrace, or entailed suffering, I would certainly discourage it; but since it does not, I deem it wise to encourage such a marriage, if the parties most interested believe, after reflection, that their own happiness will be promoted thereby.

That there are some deaf persons sprung from deaf parents is admitted, but their number is very small. There has been much discussion of late years about the advisability of deaf-mutes marrying, lest the infirmity of deafness may descend to their offspring, and a deaf variety of the human race be formed. Until a few sparrows will make spring, this hobgoblin will never materialize. Deafness is not continued by hereditary transmission in a direct line, except in rare instances. Not two per cent of the deaf and dumb are the children of deaf parents, though it cannot be denied that a susceptibility to the infirmity inheres in certain kindreds; so that we find it true, that, while a deaf pair seldom have deaf children, they have numerous other relations—as uncles; aunts; first, second, and third cousins; nephews; and nieces—who are thus afflicted. Hence, if some philanthropist is more concerned for the happiness of those who as yet are not, and may never be, than of those who now are and will for years continue with us, let him not discourage the marriage of those who are deaf, but that of their kinsmen; as, these being able to hear, and having all social advantages, the deprivation will not be so serious a matter to them as to their deaf relatives. The truth of this matter is, that, after laying all maudlin sentiment aside, there is no other class of people who so greatly need the companionship of the conjugal relation as the deaf and dumb. Shut out from church privileges, as preaching of the Word, prayer-meetings, socials, receptions, lectures, concerts, parties, what remains to them of all that makes life pleasurable to us? The deprivation of their hearing has not diminished their social instincts. For companionship, family ties, and festive associations, they have as strong affinities as any one. The isolation caused by deafness, I believe, makes the marital impulse stronger in them than in others. To forbid them, as some would, matrimony, the one remaining but most helpful and enjoyable of all social and family relations, is a monstrous cruelty with very little reason. For these reasons, after many years of observation, in which I have known hundreds of instances of deaf-mute unions, and after closely studying my more than two thousand pupils, one of my highest pleasures and satisfactions is to see them judiciously and happily mated in the conjugal relation. For the foregoing reasons I have long approved, and still do, of the marriage of the deaf; and I believe that, as a general rule, their intermarriage is more congenial, and productive of more happiness, than the marriage of deaf with hearing persons, though I have known most beautiful and happy unions of the latter kind. "Be ye not unequally yoked together," is a Scripture injunction that bears with as much force upon the deaf as upon any others. That it would be possible in process of time to generate families who would all be deaf, I fully believe.

If the object of matrimony was only to produce human animals, irrespective of their mental and spiritual nature, I should advocate the prevention of the marriage not only of the deaf, but of some other classes who labor under physical defects. But this is not the case. A true marriage is upon a higher and holier basis than this. Its essential element is in the affections of a pair whose perfect union is necessary to their happiness. The happiness of this pair I believe to be of more consequence to themselves and to society than the possible or even probable inconvenience of their offspring. I say inconvenience, for deafness is neither a crime nor a disgrace; nor does it inflict any suffering on its subject. There was a time when the deaf were considered but brutes, and classed as idiots, and treated accordingly. That time, all are thankful, is past; and in our time deaf persons often stand in society the peers of any others, in all that makes true nobility of character and manhood. In education, in mechanical skill, in æsthetic culture, in artistic talent, in true refinement and taste, they are oftentimes above the average of hearing people; and sometimes the deaf member of the family is the one of all his kindred most entitled to respect, because his deafness, having withdrawn him from his surroundings, has placed within his reach an education and culture that enables him to live on a much higher plane than any of his relations enjoy, and than he would have enjoyed if he had not been deaf. There is in society a vast amount of practical ignorance concerning the deaf, which it seems almost impossible to eradicate. This is one of the heritages handed down from former times, when deafness was indeed a great calamity, consigning its subject to perpetual infancy in law, and to dense ignorance for life. But, as already stated, times have changed; and what was once a calamity is now only a serious inconvenience. There are other inconveniences that descend by heredity that we might quite as well combat through matrimony as deafness. Baldness is a physical defect that is often (in fly-time and in cold weather, or when sitting in a draught, for instance) a great inconvenience; but who ever thought of classing the bald-headed among the defective classes, or of regarding baldness as a crime or disgrace? Near-sightedness is a physical defect that is often very inconvenient; but who ever thought to trace the pedigree of bald or near-sighted people, to see if they might enter into wedlock? PHILIP G. GILLETT.

Jacksonville, Ill., Oct. 22.

Chalk from the Niobrara Cretaceous of Kansas.

THE chalk from the Niobrara cretaceous of Kansas has long been known, but, so far as I am aware, little has been hitherto discovered regarding its structure or formation. Professor Patrick, some years ago, stated that it contained no microscopic organisms, but afterwards, with the aid of a very high power objective, found what he thought were organic remains. This is all the more remarkable, as the chalk appears to be wholly composed of organic forms, very readily visible under a comparatively low power (a one-fifth or a one-sixth objective and a C eye-piece). A ready way to detect them is by allowing a thin film held in suspension in water to dry on a slide, afterward mounting in balsam. I have examined a number of specimens, and find the material composed of small elliptical disks, either with four depressions or foramina, leaving ridges in the shape of a Greek cross, or with one or two central depressions or nuclei. Scattered among them are small slender rods, and occasionally a number of these were seen attached to a central mass. I believe the disks to be coccoliths (discoliths), which occur abundantly in the white chalk of England, and, at the present day, in deep-sea deposits. The Kansas chalk, however, has always been thought to be a shallow-sea deposit,—a belief strengthened by the abundance of thick-shelled molluscan remains, such as certain *Inocerami*, *Rudistes*, etc. The Kansas chalk, unlike the English, shows no flinty nodules. I shall make further examinations of material from different regions of the outcrop, which varies not a little in its physical and fossiliferous characters, and publish further results of my investigations, with figures. S. W. WILLISTON.

University of Kansas, Oct. 24.

AMONG THE PUBLISHERS.

THE Forest and Stream Publishing Company of New York will issue at once the first number of a quarterly publication entitled "The Book of the Game-Laws," compiled by the editor of *Forest and Stream*, and containing all the laws of the United States and Canada relating to game and fish.

—Messrs. John Wiley & Sons announce for immediate publication Egleston's "Metallurgy," Vol. II.

—D. C. Heath & Co. have in active preparation for early publication "The American Citizen," by Rev. Charles F. Dole. It is intended to provide a book suitable for the higher grades of the grammar-school, as well as for high-schools and academies.

—The Goldthwaite Geographical Exchange, New York, has brought out a new edition, based on the 1890 census, of "Cram's Standard American Atlas." Special attention is given in this atlas to the railway systems, which are printed in separate colors. The index is claimed to be very complete, giving not only the location of the places, but also the means of reaching them by rail, express, etc., and the banking facilities available.

—Messrs. D. C. Heath & Co., Boston, have in preparation the following additions to their valuable list of works on education: (1) the authorized translation of Compayré's "Psychologie Appliquée à l'Education," in two volumes,—Vol. I., "Notions Théoretiques," a treatise on elementary psychology; Vol. II., "Application," a practical application of the principles of psychology to physical, intellectual, and moral education; and (2) the authorized translation of Compayré's "Cours de Morale Théoretique et Pratique." These lectures are all fully indexed, and each is followed by a *résumé* of its contents.

—Three new Old South Leaflets have been added to the general series published by D. C. Heath & Co., all of them devoted to Indian subjects. The first is Coronado's "Letter to Mendoza in 1540," written probably from the Zuñi peublo, describing his search through New Mexico for the famous "Seven Cities of Cibola." This English translation of Coronado's report has never been published before except in the large and costly collection of Hakluyt; and it is of special interest at this time, when the researches of Frank Cushing and others have directed attention anew to the Zuñi country. The other two leaflets are John Eliot's "Brief Narrative of the Progress of the Gospel Amongst the Indians of New England," first printed in London in 1671, and Rev. Eleazer Wheelock's "Narrative of the Original Design, Rise, Progress, and Present State of the Indian Charity-School in Lebanon, Conn." (1762). The establishment of this school was the most important and interesting effort for the education of the Indians in New England, in the last century; Dartmouth College, of which Wheelock was the first president, being an outgrowth of the school. These papers are a valuable addition to the series of Old South Leaflets, which now furnishes so many original historical documents to our students at the cost of a few cents, Wheelock's "Narrative" being No. 22 of the series. Mr. Mead's historical and bibliographical notes to the three new leaflets are full.

—The result of the experiments at the Ohio State Agricultural Station in the cultivation of different varieties of strawberries shows that if we separate varieties of strawberries into two classes,—viz., those that continue a long time in bearing, and those that have a short season,—we find that the most prolific fall into the first class, while those that give small crops continue but a short time in bearing: in other words, those that give the greatest number of pickings during the season produce the largest crops. It might seem that the aggregate crop would depend as much, or more, upon the quantity of fruit ripe at each picking, as upon the number of pickings; it would also seem that the varieties that ripen slowly, and continue a long time in bearing, would be more in danger of dry weather than those that yield their crop in a short time: but such does not appear to be the fact. Nearly all of the very early varieties continue but a short time in bearing, yield but few pickings, and give short crops. The same is true, in a more marked degree, of the extreme late sorts. They commence to ripen late, but hold out little, if any, longer than the medium varieties. The second early or medium varieties usually give more