have suffered the consequence of a lack of any general system of public policy covering the location, construction, and maintenance of roads. American roads are far below the average: they certainly are among the worst in the civilized world, and always have been, — largely as a result of permitting local circumstances to determine the location, with little or no regard for any general system, and haste and waste and ignorance in building.

Among the benefits attendant upon the proper construction and maintenance of roadways, the speaker mentioned the following. Good roads attract population, as well as good schools and churches, and they improve the value of property; so that it is said a farm lying five miles from market, connected by a bad road, is of less value than an equally good farm lying ten miles away from market, connected by a good road. A larger load can be drawn by one horse over a good road than by two over a bad one. Good roads, consequently, encourage the greater exchange of products and commodities between one section and another, besides being of great value to railroads as feeders.

As one solution of the road problem, Col. Pope outlined the following plan. A commissioner of highways might be provided for, in the Agricultural Department, with a corps of consulting engineers, and suitable appropriations made for the prosecution of a general supervising work. Under the charge of this commission, full systems of maps should be prepared; based largely, perhaps, upon the working of the state and county boards, showing more or less completely, as circumstances would permit, the highways of the country.

For co-operation with this central bureau, and the prosecution of the work in the most thorough and practical way, each State should have its highway commissioner, charged with the highest interests of the State in the way of maintaining its system of roads under the most approved methods and for the general public welfare. Then the best practical results could probably be attained by the division of the State into highway districts, consisting of counties, or perhaps townships, each of which should have its overseer, in full charge of the opening and construction of new roads in his district and the proper maintenance of all, responsible for the expenditure of the regular appropriations for these purposes. These districts could then be divided into smaller ones under sub-overseers.

The importance and the value to any country, any section, and every citizen from the highest to the lowest, whether tax-payers or tramps, of well-constructed and properly maintained roads, are not easily estimated, but clearly are greater than of many affairs which are continually receiving the time and attention of the people in their homes, counting-rooms, public meetings, and legislative halls. It is a matter to be considered side by side with our splendid and always improving system of public education, the assessment of our tariff duties, or the appropriations regularly made for river and harbor improvements.

R. A. PROCTOR MEMORIAL FUND.

THE English magazine *Knowledge* calls attention to the announcement in many of the London papers stating that the monetary affairs of the late Mr. Proctor have now been wound up by his administrator, and that the total sum available as provision for his widow and the seven children (four of whom are daughters, and one a little boy, a permanent invalid from hip-disease) is under £2,000. To the small income which this will produce there is to be added £100 per annum from the Civil List; which is, however, granted only during Mrs. Proctor's life.

The £2,000 above referred to as the value of the residue after the settlement of all debts, some of which were waived, has been produced by the sale of Mr. Proctor's copyrights. Mrs. Proctor and the eldest daughter have, under a satisfactory arrangement with Messrs. Longmans, retained a small interest in the works now in Messrs. Longmans' hands, including the "Old and New Astronomy," which will shortly be completed. But the value of the interest retained (calculated on the basis of the sum given for the remainder of these copyrights by Messrs. Longmans) is included in the £2,000, as is also the money received for all the other copyrights, which were purchased on liberal terms either by Messrs. Chatto & Windus or by Messrs. W. H. Allen & Co.

The money given immediately after the death of the late Mr. Proctor by the Royal Literary Fund, and the proceeds of five lectures given by Mr. W. Lant Carpenter, as well as gifts from other friends, have enabled the family, who, owing to the suddenness of Mr. Proctor's death, were absolutely without resources, to weather through the first year. But these funds have now been exhausted, and a committee is in course of formation which the many friends of Mr. Proctor are invited to join. Subscriptions to the R. A. Proctor Memorial Fund, and communications, will be received by Mr. E. G. Mullins, manager of the City Bank, Bond Street Branch, London, England.

Since the date of the announcement in the daily papers, the following subscriptions have been received: William James Adams, Esq., 10s. 6d.; "E. A.," £2; Mrs. Barrett, £2; "J. A. B.," £1; Andrew Chatto, Esq., £5; H. P. Curtiss, Esq., £5; W. Henry Domville, Esq., £10; "W. D.," £2 2s.; "A Friend," £1; Professor Grant, £2 2s.; Lord Grimthorpe, £20; D. Hodgson, Esq., £1; Edmund Johnson, Esq., £1 1s.; Messrs. Longmans, Green, & Co., £20; J. Mott Maidlow, Esq., £3 3s.; Miss Martin, £2; G. H. Mellor, Esq., 10s.; R. Hay Murray, Esq., £5; "Planetoids," 10s. 6d; T. Shaw Petty, Esq., £10 10s.; Oscar Rohde, Esq., £3 3s.; T. C. Sandars, Esq., £5; William Schooling, Esq., £2 2s.; F. Stevens, Esq., £1 1s.; Col. N. G. Sturt, £5; Mrs. Stowe, 5s.; Walter Weblyn, Esq., £1 1s.; Philip Williams, Esq., £1: total, £113 1s. Others have promised.

A NEW METHOD OF PREPARING FLUORINE.

A NEW method of preparing fluorine has been discovered by M. Moissan. This discovery is the outcome of the success which has attended M. Moissan's efforts to prepare anhydrous fluoride of platinum. During the process of his memorable work upon the isolation of fluorine by the electrolysis of hydrofluoric acid containing hydrogen potassium fluoride, one of the most remarkable phenomena noticed was the rapidity with which the platinum rod forming the positive electrode was corroded by the action of the liberated gaseous fluorine. It was surmised that a fluoride of platinum was the product of this action, but hitherto all efforts to isolate such a body have proved unsuccessful. In fact, for a reason which will be discussed subsequently, it is impossible to prepare platinum fluoride in the wet way. M. Moissan has, however, as stated in *Nature*, been enabled to prepare anhydrous platinum fluoride by the action of pure dry fluorine itself upon the metal. It was found at the outset, that, when fluorine is free from admixed vapor of hydrofluoric acid, it exerts no action whatever upon platinum, even when the latter is in a finely divided state, and heated to 100° C. But when the temperature of the metal is raised to between 500° and 600° C., combination readily occurs, with formation of tetrafluoride of platinum and a small quantity of protofluoride. The moment the gas is mixed with a little vapor of hydrofluoric acid, the action is immensely accelerated, and then occurs readily at ordinary temperatures. The same rapid action occurs when platinum is placed in hydrofluoric acid saturated with free fluorine, which accounts for the disappearance of the positive terminal during the electrolysis.

In order to prepare the fluoride of platinum, a bundle of wires of the metal is introduced into a thick platinum or fluor-spar tube, through which a current of fluorine gas from the electrolysis apparatus is passed. On heating the tube to low redness, the wires become rapidly converted to fluoride, when they are quickly transferred to a dry stoppered bottle. If the operation is performed in a platinum tube, a large quantity of fused fluoride remains in the tube. The tetrafluoride of platinum (PtF_4) formed upon the wires consists either of fused masses of a deep red color, or of small buff-colored crystals resembling anhydrous platinum chloride. It is exceedingly hygroscopic. With water it behaves in a most curious manner. With a small quantity of water it produces a fawn-colored solution, which almost immediately becomes warm, and decomposes with precipitation of hydrated platinic oxide and free hydrofluoric acid. If the quantity of water is greater and the temperature low, the fawn-colored solution may be preserved for a few minutes, at the expiration of which, or immediately on boiling the solution, the fluoride decomposes in the manner above indi-

cated. This peculiar behavior with water explains the impossibility of preparing the fluoride in the wet way.

When the anhydrous fluoride is heated to bright redness in a platinum tube closed at one end, fluorine at once begins to be evolved as gas; and, if a crystal of silicon be held at the mouth of the tube, it takes fire, and burns brilliantly in the gas. The residual platinum is found, on examining the contents of the tube, to consist of distinct crystals of the metal. Hence by far the most convenient method of preparing fluorine for lecture purposes is to form a considerable quantity of the fluoride, first, by passing the product of the electrolysis over bundles of platinum wire heated to low redness, and afterwards to heat the fluoride thus obtained to full redness in a platinum tube closed at one end. It only remains now to discover another method of preparing fluoride of platinum in the dry way, to be able to dispense with the expensive electrolysis apparatus altogether. M. Moissan has also prepared a fluoride of gold in the same manner. It is likewise very hygroscopic, decomposable by water, and yields gaseous fluorine on heating to redness.

MENTAL SCIENCE.

Diseases of the Memory.

Cases of amnesia, or the loss of a small or large portion of the contents of the mental storehouse, have been observed from very ancient times, and have always attracted attention. The decline of mental powers brought on by old age is frequently introduced by a failure of memory. When, however, this sets in at an earlier period, and develops rapidly and to an extreme degree, we recognize an abnormal and striking phenomenon. The possibility of such loss, particularly when following a purely physical cause, such as a blow, a fall, or other accident, could not but suggest the physiological counterpart of the memory process as something very material. To-day we attempt to analyze such cases more minutely, recognizing in the diseases of memory a natural experiment that throws light upon the laws of mental growth and decay, the interrelation of the various avenues of knowledge, as well as the *nexus* of mental function with anatomical characteristics. In all these aspects a recent study of diseases of memory by Dr. Korsakoff of Moscow (*Revue Philosophique*, November, 1889) is interesting.

The first case described is that of a Russian writer afflicted with multiple neuritis, — a nervous disease affecting many groups of fibres, as a consequence of alcoholic excess. When the patient was first seen, the trouble was very marked. He had completely forgotten all recent events: he did not even remember whether he had dined or not. The conversation just held was at once forgotten; and, when outsiders insisted that such and such things happened that the patient had forgotten, he lightly remarked that he always had a poor memory. Very striking is the fact that every thing previous to the onset of the disease he remembers clearly. Of a novel that he was writing at the time, and had half finished, he remembers the first half, but does not remember how he intended to finish it. Though the domain of his thoughts is limited, his reasonings are logical, and his judgment sound. But a slight interruption in the conversation will make him forget what it was about; and he will say the same things over and over again, using the same stereotyped forms of expression, and forgetting that he has said it. Moreover, under the influence of certain external stimuli, certain positions and suggestions, he will always make the same remarks, in which he draws upon the old storehouse without adding to it. There are indications, too, that to a slight degree the unconscious registration of impressions is going on. Thus, though he forgets Dr. Korsakoff between each visit, he always makes the remark (regarding it as original each time) that the latter is a physician. Emotions and feelings make more of an impression than facts and associations. A *post-mortem* examination in this case showed degeneration of both fibres and cells, which had also been inferred from paralysis and other symptoms observed in the patient.

Impairment of memory is characteristic of this disease; the memory for recent events being lost, while that for events antedating the attack remains, and the patient retains judgment and reasoning power. The same patient who forgets that he has dined five minutes after leaving the table can play cards or checkers with fair skill, anticipating the consequences of his or his adversary's plays, and following out a plan of attack or defence. If the game is slightly disturbed, he cannot go on. The moment he is through playing, he knows nothing of it, and will declare he has not played for a long time. The contrast between the past and the present is sharply brought out in one patient who tells of his travels at great length, but repeats the tale a dozen times an hour, and always with the same phrases. Sometimes the patient does not even recall that he is ill, explaining a paralysis as a momentary cramp in the legs, and expressing his intention of rising as soon as that has passed. The same patient will cry out under his pain, but a moment later will have forgotten the sound and the pain. To show how slight an interval is needed for the impression to disappear, it may be mentioned that this patient, in reading, will read the same line twice, having forgotten the one line before setting out upon the next. Those who are constantly with such patients soon get to know what they will say upon the usual occasions. Their life is monotonous, — a response to the suggestions from the outside, and not originating from internal impulses. They are frequently conscious of their infirmity, and anxious lest they commit some indiscretion.

Dr. Korsakoff thinks, that while the patient does not consciously remember what is going on, yet the surrounding events leave some trace by which future conduct is influenced. Thus a patient who was undergoing an electric treatment, and forgot all about it each time, not being able to tell what the doctor was about to do, if asked to look about him, recognized the apparatus and its purpose, which he did not know before his illness. Another patient, who said "Good-morning!" when the doctor made his first visit of the day, did not remember the visit three minutes later, but did not then say "Good-morning!" The most convincing proof of this, however, appears when recovery sets in, and the patient begins to tell some little of what happened during his illness. In one case a sphygmograph was described, — an instrument the patient had seen only during his amnesic period. Emotional states seem the ones most susceptible of this unconscious perception. While the patient forgets his visitors from one time to another, yet he meets them with sympathy or antipathy, according to previous experiences; or, again, a patient who was treated with electricity remembered nothing of it, but was always put into a bad humor when he saw the machine.

In the process of recovery, usually quite gradual, several interesting phenomena appear. Frequently the patient begins to remember events, but in isolation. He cannot tell what happened just before or just after. He cannot tell *when* things happened; as a rule, regarding all things as more recent than they really are. When he begins to remember new faces and places, he still continues to repeat the same sayings again and again. He will be able to say that he has read a certain thing, but does not remember what it contained. Though not able to recall the events of his illness at will, an incident or a suggestion may bring it up. Little by little his past is filled out, though in a somewhat chaotic manner; dreams and the products of his imagination intermingling with real events without definite relation in time. He frequently continues to believe what has no basis in fact. His recovery is often a matter of two or three years. In another case, after five years the memory of the patient continued weak. He was able to resume his occupation of correcting sheets for the press, but had to keep his finger on the lines so as not to go over the same line twice. He even began to practise law, though he was compelled to avail himself of all sorts of memoranda, and was frequently perplexed by forgetting what he had said; yet he was able to conduct himself consistently. The memory for places, streets, and houses, localities in general, is restored long before that for time.

Dr. Korsakoff next attempts to analyze just what factor in memory is affected, concluding that it is simply the power to recall impressions; the facts above cited showing that the impression is made, though very faintly. Moreover, as recollection is based upon association, those ideas being most at command that have the widest and deepest associative connections, the defect is referred to that portion of the nervous system instrumental in connecting nerve-centres with one another. Into a more detailed and neces-