Its next use, I take it, is to control the tremors which we get in multiple sclerosis, in chronic alcoholism, and in paralysis agitans, and in many cases of general paralysis it greatly improves the powers of co-ordination when they are affected.

To rapidly subdue delirious and maniacal excitement it is certainly a valuable agent in experienced and careful hands, and will act more rapidly and more surely than any drug I know when given hypodermically; but as it is not a safe remedy I look upon the indiscriminate use of it as a powerful and sudden hypnotic as *its abuse.*

In some instances, as I have said, it certainly acts in a way no other drug known to me can act, but it may be attended in other cases with sudden fatal results, and I therefore think I am right in calling the indiscriminate use of a remedy with a possible action of this sort *its abuse.*

The kind of cases I believe it to be unsuitable for, I have already mentioned.

I trust there may be many here to-day who have definite experience of this, to my mind, valuable medicine, and that the discussion will throw more light upon its remedial powers and uses in mental disease.

Nothing, however, will shake my firm belief in the utility of the alkaloid in the class of cases I have tried my best to describe as suitable for its administration.

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*On the Arithmetical Faculty and its Impairment in Imbecility and Insanity.** By WILLIAM W. IRELAND, M.D.

The operation of counting is so familiar to us, and so easily brought under mental observation, that a definition of what it is in learned terms does not make anything clearer to our minds. The abstract idea in numbers is as many as, five, that is, as many fingers as I have, as many as you have, as many as your mouth and eyes and ears together, or as many as the sepals of the rose.

Numbers relate both to time and to space, phenomena occurring successively as well as simultaneously, as many as, and as often as. He has as many teeth as you have lived years. The infant at first sees everything as one. Gradually it begins to differentiate, to distinguish itself from other things,

* Read to the Meeting of the Medico-Psychological Association, at Edinburgh, 12th March, 1891.

one person from another, one discrete object from another. Then children learn to distinguish quantities, they know a big piece of cake from a small piece; but even after a child has learned to speak, more than two years pass away before he can be taught to count. Thus children exercise many of their faculties before they arrive at the arithmetical one, and some do it very slowly. The power of counting comes with age and the growth of the brain. It is noticed by teachers that bright, sharp children with good memories, who get above older children in the class, do not readily surpass them in arithmetic. It is frequently stated in books of anthropology that savages very low in the scale of humanity cannot count above some small figure.* The Weddahs of Ceylon are said to have no word for any number; the Tasmanians used to have words for one and two, for three they would say two and one, and sometimes two and two for four. To indicate five they lifted their hands as high as a man's head. Thus, although they had the idea of the number five, they had no word for it; for higher numbers they would only say many. "Throughout Torres Straits † there were practically but two numerals, *urapun* and *ōkŏsā*, which were respectively one and two in the western language. Three is *okosa, urapun*; four is *okosa, okosa*; five is *okosa, okosa, urapun*; six is *okosa, okosa, okosa*; beyond that they usually say ras or a lot." The Australians have only two numerical expressions; but by combining them they can count as far as 10. The most intelligent, when they want to express the number five, say "hand," and for the number 10 they say two hands. Sometimes for four they say as many as the toes of the emeu. The Bushmen have only two names for numerals, and reach a little higher by repeating them, as $2+1$, $2+2$, $2+2+1$, and so on. Our system of numbering by tens and twenties, which prevails in almost all languages, shows that men originally began counting on their fingers.

Most of the tribes in New Caledonia, according to Letourneau, have only four nouns of number. For five they say "a hand," "two hands" will mean ten. If they wish to go beyond ten,

* "Sociology based upon Ethnography," by Dr. Charles Letourneau, English translation, London, 1881, p. 583.

† See a paper on the "Ethnography of the Western Tribes of Torres Straits," by Alfred C. Haddon, "Anthropological Journal," Vol. xix, p. 303. Taine in his book on Intelligence, London, 1871, has the following note: "As to the primitive meaning of our nouns of number, see Bopp. Comparative Grammar (tr. Breal), ii, 221. *Tri* (three) means exceeding, *i.e.*, the two inferior numbers. Four probably means three *plus* one; five, four *plus* one; ten, twice five. A hundred certainly means ten times ten. A thousand probably means many, a great number" (p. 412.)

they begin to count again as far as five, and after that they put forward a foot, or five toes. When they have got as far as twenty they say "a man," that means all a man's fingers and all a man's toes. Some few clever calculators can continue in this way, but the most skilful mathematicians in all New Caledonia cannot get beyond two or three hundred. Beyond this colossal extent of numeration, people make use of the expressive saying, "The grains of sand could not count it."

If you ask a Greenlander the number of people about, and he wishes to say fifty-three, he will say the third man on the third foot, *i.e.*, he counts the fingers and toes on three men till he comes to the number three on the first foot of the third man. Traces of this remain in our arithmetical notations. The Roman I. originally represented a finger; II., two fingers; and so on up to V., for at least one way of writing IV. was with four strokes, IIII.* The Roman V. represents the hand, four fingers held together and the thumb held separate. X. represents the two hands drawn together or two V.'s affixed to one another, the undermost being upside down. The Arabic cipher for five seems to me to be the closed hand, the upward stroke being the thumb. In the Indian 3 we have our own figure for three, three digits represented laterally instead of vertically, as in the Roman. It is thus clear that men beginning to count rested their eyes upon visual symbols; for higher numbers they helped their conceptions with small objects easily shifted, added, and subtracted, hence the word calculate from calculus, a pebble. In higher numbers the cipher used must have been always more ideographic than figurative. The Mexicans, who without any help from the Old World, worked out a system of notation of their own, indicated the first twenty numbers by an equal number of dots. The first five, Prescott† tells us, "had specific names, after which they were represented by combining the fifth with one of the four preceding, as five and one for six, five and two for seven, and so on. Ten and fifteen had each a separate name, which was also combined with the first four, to express a higher quantity. These four, therefore, were

* Of course IV. means one finger less than a hand. In some cases numbers are expressed by a subtraction from a round number like ten, as in the Latin *undeviginti*, in the Hindustani *unis* = 19, one from bis = 20, untis = 39, one from tis = 30, untalis = 49, one from chalis = 40. The Yombas of Western Africa, who have a curious system of numerals, also, in some instances, make use of subtraction. See paper on "The Numerical System of the Yomba Nation," by Adolphus Mann, in the "Anthropological Journal," Vol. xvi, p. 60.

† "Conquest of Mexico," Vol. i, Chap. iv., p. 98.

the radical characters of their oral arithmetic, in the same manner as they were of the written with the ancient Romans, a more simple arrangement probably than any existing among Europeans. Twenty was expressed by a separate hieroglyphic —a flag. Larger sums were reckoned by twenties, and in writing by repeating the number of flags. The square of twenty, four hundred, had a separate sign, that of a plume, and so had the cube of twenty, or eight thousand, which was denoted by a purse or sack. This was the whole arithmetical apparatus of the Mexicans, by the combination of which they were enabled to indicate any quantity. For greater expedition they used to denote fractions of the larger sums by drawing only a part of the object. Thus, half or three-fourths of a plume or of a purse represented that proportion of their respective sums and so on."

In building up a science of numbers men steadied their conceptions with names. Though the name does not furnish the idea, it is only with names retained in the mind as a series that we can reach and realize the conception of high numbers. It may appear that we have no precise conception of a number like a hundred thousand, or a million, but while such names may be repeated with only a vague idea attached, they surely conduct to conceptions which are very precise. We can always make an exact correspondence between the group of units indicated by the name in our minds and the outer heap or succession of units in the phenomenal world. No abstract ideas in our minds, therefore, contain less error, and have clearer relations to outward objects; men who differ about everything else, about the just, the true, the good, or the beautiful, who would dispute about every point in religion or politics, would agree in counting a heap of objects, or adding a column of figures.

Then we see our ideas of numbers pervade all nature, in the relations of the stars and planets, as well as in the sides of the minutest crystal. The numbers of parts of the flower are repeated in the same multiples. Two and five are the commonest figures in nature; two answers to the double brain and five to the digits of each limb, which are all severally represented in the brain.

Some people, in thinking of numbers, always associate them with the corresponding ciphers; others with certain figures, such as the corresponding number of dots. One boy told me, in thinking of small numbers, he always conceived them as so many dots or spots arranged in a form, which he showed me, and which seemed the same as that of the numbers in dominoes.

Others conceive of numbers as if arranged in a series, as might be on a board, in lines of various direction, the rows of ciphers generally breaking off in a new direction at 10 or 12. This peculiarity illustrates the tendency to connect visual images with our ideas of numbers. Mr. Galton,* who has written a curious essay upon the subject, found these "number-forms" to occur in about one in thirty of men and one in fifteen of women.

I have here a chart which a lady has written for me, showing how she pictures to herself numbers in a series, as if written on a board. It resembles some of those in Mr. Galton's engravings.

Some writers on anthropology, mostly evolutionists, after giving instances of the meagre vocabulary for numerals amongst wild tribes, treat them as proofs that savages have no capacity for counting—that they have never arrived at the stage in which the arithmetical faculty has been evolved.

Romanes† quotes Galton's observations in Africa to show that in dealing with certain savages "each sheep must be paid for separately, thus: Suppose two sticks of tobacco to be the rate of exchange for one sheep, it would sorely puzzle a Dammara to take two sheep and give him two sticks. All that such facts show is that in some respects the higher receptual life of brutes attains almost as high a level of ideation as the lower conceptual life of man." Mr. Romanes, in a note, goes on quoting Mr. Galton: "Once, while I watched a Dammara floundering hopelessly in a calculation on one side of me, I observed Dinah, my spaniel, equally embarrassed on the other. She was overlooking half-a-dozen of her new-born puppies, which had been removed two or three times from her, and her anxiety was excessive as she tried to find out if they were all present, or if any were still missing. She kept puzzling and running her eyes over them, backwards and forwards, but could not satisfy herself. She evidently had a vague notion of counting, but the figure was too large for her brain. Taking the two as they stood, dog and Dammara, the comparison reflected no great honour on the man." It seems as if Mr. Galton were more anxious, in this comparison, to produce a rhetorical effect than to give due credit to the Dammara. Another African

* "Inquiries into Human Faculty," by Francis Galton, London, 1883, pp. 114-145.

† "Mental Evolution in Man: Origin of Human Faculty," by George John Romanes, London, 1888, p. 215. The reference is to Galton, "Tropical South Africa," p. 213.

traveller, Sir Samuel Baker, says :* "All those savages I have actually visited, not only have speech, but also numerals."

Nevertheless, it seems fairly proved that there are savages who, in their rude struggle with the forces of nature to gain a living, have taken little trouble to distinguish separate objects by counting, or to devise names for numbers, but it would be rash to assume that they could not do so if they were taught. Mr. Romanes boasts of having taught a chimpanzee to count up to five; that is, the animal would, when in good humour, give him four or five straws from its mouth on Mr. Romanes naming the words one, two, three, four, or five. "Farther than this," observes Mr. Romanes, "I have not attempted to take her." Perhaps it would have been more correct to say : "I could not succeed in taking her." I myself am not quite satisfied about this accomplishment of the ape. I should say that the idea of numbers could not be proved complete unless the chimpanzee not only would give at the word of command four or five straws, but four or five of anything. Nevertheless, I am not disposed to deny that an intelligent animal like an ape might be taught to count up to five, but had Mr. Romanes tried also to teach figures to a Dammara the wide gulf between the intellect of the man and that of the monkey would soon have been manifest. The Dammara might have needed to begin at five, but he could soon have been carried into combinations impossible for the intelligence of any of the brutes. The fact is that all men, civilized or uncivilized, have a potential capacity for arithmetic, which in the savage as well as in the ignorant often dies uncultivated. This has been proved by experience in missionary schools, where the children of the lowest savages have been taught.

Take the case of the Polynesians, separated by a wide ocean from the civilized nations of the earth. They lead, or, at least, used to lead, a simple life, enjoying the plenty of their sunny isles, with an easy unconcern about property; no way vexed with toil, and unacquainted with serious mental exertion. These primitive savages were found to have a scanty vocabulary of numerals, but it was found that they had a capacity for arithmetic much beyond the requirements of their ancestors from time immemorial.

In my inquiries on this subject, I wrote to the Rev. Dr.

* See his letter in Dr. Bateman's "Darwinism tested by Language," London, 1877, p. 176. Baker adds: "They usually count in tens, taking for the base of their calculations their digits."

George Turner,* who was long a missionary in Samoa. In reply he says: "You are quite right, I think, in concluding that in the very lowest strata of savage life there is a potential faculty for arithmetic which could be cultivated to any extent. At the close of an arithmetic book in Samoa we have added the first book of Euclid. In the Sandwich Islands they have a separate book, embracing the six books of Euclid."

Before being visited by Europeans the Maoris are said to have been able to count up to a hundred; after that they were hazy. Now they have been proved to possess great arithmetical ability.†

Another missionary, Dr. W. A. Elmslie, who has also kindly answered my inquiries, thus writes from his experience in Africa: "Among the Ngoni, where cattle are abundant, I have never met a case where the loss of a beast was known by counting, even a large herd. They do not in practice count their cattle, as they do not count anything, from some superstitious idea that it is unlucky to do so. This does not, however, I think, bear out an assertion that they cannot do so; the strong superstition of the tribe comes in as an explanation."

The following observations made by Dr. Elmslie apply generally to four tribes living on the western shore and upland districts of Lake Nyassa, viz., Ngoni (who are of Zulu origin), Tusubuka, Tonga, and Nyanja.

"The method of counting in all these is very similar.

"1. They can count up to any number, though in practice, according to the requirements of their primitive life, they do not count very far. Any number beyond say twenty they will say is a 'great many,' not because they cannot count, but because they never have occasion to be exact. In counting up, the mistakes they may make in the higher numbers are only the result of inattention and not inability.

"2. They have the names of numerals up to five and the name of ten. The Ngoni have a word for 'hundred,' but it is seldom used. They count thus: 1, 2, 3, 4, 5, 5 and 1, 5 and 2, etc.; 10 (or 'one ten') 10 and 1, and so on. For 20 they say 'two tens,' so that they count by tens.

* Dr. Turner has published two books which are full of observations of great interest to the anthropologist, "Nineteen Years in Polynesia," London, 1861, and "Samoa a Hundred Years Ago and Long Before," London, 1884. While correcting the proofs I have heard with much regret of the sudden death of this distinguished missionary.

† See paper on the Maoris of New Zealand, in Vol. xix. of the "Anthropological Journal," p. 113.

"3. They use their fingers in counting. They begin with the hand shut, and open out finger by finger beginning at the little finger, and when five are counted they close the fist and proceed with the other hand, and on reaching ten they shut both fists and clap them together just as they say 'ten,' and so on, time after time, carrying in their minds the number of tens so counted.

"4. There is undoubtedly marked capacity for learning arithmetic, and we have children working up to the compound rules. Geometry has not been tried."

Another missionary, Dr. D. Kerr Cross, thus writes, referring to the tribes around Lake Nyassa: "My experience among the savage races of Africa leads me to the belief that they are not nearly so defective in the arithmetical faculty as Dr. Tylor indicates in his 'Primitive Culture.' With me they can easily go up the length of two tens, and indeed somewhat beyond such, if occasion requires. They close the fist indicative of five, strike the double fist for 10, and strike the legs with the closed fists for 20. Seldom do they go beyond this number. As far as I know they have no word for 10 tens, although Dr. Law, in a neighbouring dialect, gives a word. Should attention be paid to them the youth of any tribe can be taught to count with some degree of accuracy, as is observed in our schools."

The Darwinians are accustomed to account for the origin of the superior mental faculties of man by the assumption that they were gradually evolved from an intelligence once lower than that of a monkey through the struggle for existence and the strain of competition. They at first thought that in the rudimentary numerical faculty noticed amongst savages they had lighted upon a stage of mental development not much higher than that of the ape, but when it appeared that in the children of these very savages there was a potential capacity never called into exercise by their ancestors, a difficulty arose under which their hypothesis would not work. Indeed, Mr. Wallace, in his book upon Evolution, devotes a chapter to show that the human capacity for arithmetic and geometry could not be explained by any process of development through the struggle for existence, or sexual selection. Yet the arithmetical talent seems to be a special faculty of the human mind. Though all normal children can be taught to count, some learn quickly, others slowly; some become very expert at figures, others have little aptitude; some men take a delight in working at arithmetical problems, others have a distaste for them. In general, simple men who have had little schooling dislike arithmetical calculation. I have been told that the fishermen in Prestonpans, who take shares in their boats, when they count their gains do not make use of any ciphering or mental division. If there are seven of them to a boat's crew they all assemble, and the money gained is counted out before their eyes in seven portions, which they take and go away. Mr. Winter writes:* "It is a characteristic fact that the criminal classes generally distinguish themselves by a remarkable ignorance of the science of numbers. Nevertheless at the Elmira Reformatory they learned arithmetic quickly."

There are instances of extraordinary development of the arithmetical faculty in early life, such as was shown by George Bidder and Zerah Colborn, which partakes of the mysterious, for it appears that these childish prodigies could perform surpassing feats in calculation without ever being taught the ordinary methods devised through ages for the easier working of such difficult problems. This, I think, shows that the arithmetical faculty is different from the methods by which it is cultivated, and that men can work by different symbols and processes from those usually employed. It often happens that those who are very skilful in solving arithmetical questions have no unusual ability for anything else. In framing his system of phrenology Gall arrived at the idea that number was a special faculty, and sought a locality for it in the brain. He fixed it in the frontal lobe above the outer angle of the eye, just below the place assigned for the faculty of music. It is curious that in the mental manifestations in idiocy and imbecility we find that of all human faculties that of music is the best preserved, whereas that of number is the most deficient, yet music seems to have a certain connection with number. A tune depends upon the numerical relation of certain notes to one another and upon their succession in time. Even idiots who cannot speak catch up tunes and hum or grunt them. To be able to learn to speak is a measure in the capacity of imbeciles, but speech may be freely exercised without their being able to count. This deficiency is universal, comprising all classes of imbeciles. The old legal definition of an idiot is "one who cannot count twenty pence." Dr. Abercrombie, in his book "On the Intellectual Powers," commented upon this deficiency, and noted that it extended to

* "New York State Reformatory at Elmira," by Alexander Winter. London, 1891, p. 139.

cretins. I never saw an imbecile who was expert in figures, though such cases have been described. I should think that such prodigies are mere show cases, who have been taught to master a particular question by an arithmetical formula which after all is not difficult, such as to find out the day of the week on a given day of the month some years back.

Dr. Edward Seguin, whose experience was very great, observes in his book on Idiocy: "The greater number of idiots cannot count three, though among them, or more properly speaking among imbeciles, are found children wonderfully skilled in the arrangement of figures and in calculations of various sorts. This automatic genius does not belong to them as a class, nor imply in its rare possessors any susceptibility to general improvement."

Some cases of great aptitude for figures with imbeciles are quoted in my book on "Idiocy and Imbecility." As already said, none of them came under my own observation. As a general rule, with great pains and great skill in teaching, imbeciles may be brought through addition, subtraction, and multiplication, but rarely through division. Though in most cases it is the more intelligent who learn arithmetic best, I have seen many imbeciles who understood all the ordinary relations of life, could conduct themselves well in society, go about alone, learn to read, and had quite a respectable amount of general intelligence, who, nevertheless, could not work with figures, could not give change for a shilling, and could not multiply by two up to twenty without stumbling. This is not because they do not remember the names, but because they fail to attach any idea to them. In general they may be said to understand numbers as far as they can be seen at a glance, though even then they are slow at counting objects held before them, and are liable to make mistakes through inattention, or through counting the same thing twice over.

In teaching imbeciles numbers, it is best to do so on small objects, like beans or grains of maize; mixing these objects does not seem to perplex them. They reach the idea of numbers through the variety. After they have learned to count a little, one tries to teach them to multiply, and here the haziness of their arithmetical notions is apparent. For example, a boy ten years of age, who can read, and is very observant, knows railway signals, and makes shrewd remarks about people's conduct, will go on thus: "Twice four = 8, three times four = 6." Here another pupil comes to his assistance, saying, "It is 10." "What is twice ten?" Answer, "20."

"Twice eleven?" "6." Four times four is stated to be 12. Another observes: "I told him it was 16, and he would not believe me." Some of them always stick at one multiple. One boy would go on quite right multiplying by 2 up to 8, but here he would rarely say that it was 16. After that he would generally go on right up to twice 12. Another will say "Twice five = 10, three times five = 12." Or "twice four = 8, three times four = 9, three times five = 15, four times five = 16." "How many men are in a jury?" "A dozen." "Well, if three jurymen go away, how many are left?" Answer, "None." Of course these wrong answers are mixed with right ones. In general they show an easy indifference to their failures, but I used to have a pupil who would shed tears when he failed to get through four times four or six times six without stumbling. This was always done with the numbers counted out before him.

I have already described the case of a boy, "aged ten years, who knows all the colours, and is learning the alphabet. He forms an estimate of the character of those around him, and has some sense of moral relations. He talks volubly on childish subjects, but is so deficient in arithmetical power that a year ago he seemed to have no conception even of a unit. He would say that he had three heads, touching his head several times with his finger. This was not because he wanted the word, for he could repeat the names of numbers, as far as twelve at least, without any difficulty. This year, after much trouble, he seems to have mastered the idea of two, and can count cautiously up to three. When he gets to four he is extremely perplexed. If one holds out five fingers to him he will count 'one, one, two, three, four, there is four,' or at another attempt, 'one, two, three, four, five, six, seven,' and the sum total is declared to be eight. This boy is not without imagination. He is fond of arranging pebbles in a line to represent a railway train, showing he can conceive of symbols." This boy died about a year after of exhaustion from frequent epileptic fits. At the time the above passage was written these fits were only occasional. It was noticed that the sutures were still open, and that the brain was somewhat softer than usual, otherwise nothing particular to the naked eye. The encephalon weighed 55½oz.

One might suppose that this deficiency of the arithmetical faculty was owing to some injury of a particular portion of the brain, as has been observed in loss of speech through aphasia, but no such lesion has ever been pointed out in the brains of

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imbeciles, nor is there, as far as I know, any diseased condition common to all classes of imbecility. The mental inferiority may be due to cerebritis, sclerosis of the brain, microcephaly, epilepsy, or hydrocephalus, yet in all these forms we may presume that there will be a marked deficiency in the capacity for counting. This is perhaps not what one might expect when he sees a problem put into the calculating machine, say, division of high numbers, and which is brought out by the working of the machine with infallible correctness; one is then disposed to think arithmetic an almost mechanical mental operation. As Oliver W. Holmes has happily put it: "The calculating power alone should seem to be the least human of qualities, and to have the smallest amount of reason in it, since a machine can be made to do the work of three or four calculators, and better than any one of them. The power of dealing with numbers is a kind of 'detached lever' arrangement, which may be put into a mighty poor watch." It must, however, be confessed that the power of the calculating machine does not look so wonderful when one understands how it is made and adjusted.

It might be suggested that, since the arithmetical faculty is late in appearing in children, and often so deficient in imbeciles, it would be one of the first to disappear in the downward process of dementia. This, however, does not seem to be the case. Through the kindness of Dr. Clouston, I had an opportunity of examining a number of patients suffering from progressive dementia and general paralysis, and the arithmetical faculty did not seem to be more impaired than other faculties; indeed, it seemed as if it were less so. Patients so far gone in dementia that they could not, or would not, take the trouble to select or put on their own clothes, nevertheless added columns of figures with tolerable accuracy, and correctly worked sums in reduction, proportion, or other ordinary questions in arithmetic.

In a case of general paralysis it was a contrast to see a man, after making the most senseless and immoderate boastings, sit down and work in a creditable manner a question in arithmetic. While all his conversation savoured of extravagant delusions, his arithmetical exercise was correct and neatly done.

One man, in the middle state of general paralysis, gave me an order in pencil for £4,000 in paper and gold. He said an actor, on whom he wished to draw, was a billionaire. When I asked how this actor made so much money, and how much he was paid a night, he replied a hundred thousand pounds, which he said were paid in gold. I asked him if he carried this money with him when acting, when he said "Yes."

I asked him if this were not too heavy. He said "No." I then got him to calculate the weight of 100,000 sovereigns, counting each four as equal to one ounce. This he did quite correctly, but nevertheless he would not admit that the sum was too heavy. Although general paralytics talked of numbers in a wild way, it seemed to me that, when they could be induced to sit down and make a calculation, they understood the relation of figures to one another. Two of them were expert and quick in arithmetic. The demented patients in general were easily fatigued, but added figures correctly, though slowly. One patient was very diffident to begin. He had forgotten his arithmetic. I asked him what was twice four, and he said eight. This encouraged him. I then asked him to add a column of figures; the first were seven and five. He said he did not know. I said, Is it not 12? He replied, doubtfully, "It used to be." After this I got him to add a column of eight figures, which he did correctly, but very slowly.

In the downward progress of dementia the higher mental faculties do not seem to be affected in any regular succession. To take advantage of a figure used by Dr. Savage, the dissolution of the mind resembles the decay of an old house left to ruin; sometimes one part of the building falls in, sometimes another. In looking over the literature of insanity, I cannot find that the impairment of the arithmetical faculties in dementia has received attention, but those striking cases in which the patients show a morbid fondness for counting have not escaped observation. Such disorders fall under the head of *Grübelsucht* or *Folie du doute*. The mind is seized by a procession of numerical ideas which escape beyond the control of the will. Going along the road he counts the swallows which fly overhead, the men and women who pass, how many white horses there are, and so on. Emminghaus* tells us of a man who, being asked in company how he liked a song, answered: "Do you know how many letters the song contains?" The same person in walking used to count how many steps he took. Cullerre, who has written a paper † on this peculiarity, which he calls Arithmomania, finds it commonest amongst epileptics. He defines it as the impulse to combine numbers, and especially to calculate the divisions of time as seconds,

* "Allgemeine Psychopathologie," Leipzig, 1878, p. 186.

† "Les Epileptiques Arithmomanes, Annales Medico-Psychologiques," Tome xi., N. 1, p. 25. See also B. Ball, "Leçons sur les Maladies Mentales," p. 449.

minutes, hours, days, months, and years, and in general to work with figures apart from any connection of profit or interest. This affection is accompanied by an indefinable mental disturbance which, though it may be disagreeable, is not so painful as other forms of dominant ideas in which the emotions are more or less affected.

Is the inherent faith which we have in our perceptions of number ever deranged in insanity? Does a lunatic for example ever believe that 2 and 2 make 5? M. Delboeuf * thinks so. The only instance which he gives is taken from a dream, but dreaming certainly closely resembles some kind of insanity. "One night," he says, "I dreamed of a German café where I had taken a glass of beer for which I had to pay 37½ centimes, the value in French money of 30 pfennige = 1 franc 25 centimes. I approached the counter and put down first a piece of 20 centimes, then one of 10 centimes. The woman before whom I put down this money did not seem satisfied. I was astonished. 'Madame,' I said, 'do 20 and the half of 20 not make 37?' The woman did not seem to comprehend my reasoning; the waiters and others came up and supported me, and at last she ceased to insist. I quitted the café wondering at the singular aberration of a shop woman who could not see that 20 and the half of 20 do not make exactly 37½." Here, it may be observed, that the woman at the counter, who refused the incorrect sum, was a portion of M. Delboeuf's own personality; perhaps one side of his own brain refused to partake in the error of the other hemisphere!

Notes Descriptive of a New Hospital Villa recently erected in the Grounds of the York Retreat. By Robert Baker, M.D.

For many years past the Retreat Committee, whilst constantly improving the structural condition of their hospital, have entirely ceased from extending it by the former practice of adding wing to wing and corridor to corridor.

Instead of doing this they have erected various villas in their grounds with all known adaptations for the prompt treatment of the insane.

This plan of having a variety of small hospitals in different parts of the estate is manifestly a most advantageous one, for whilst the power and resources of the parent hospital are

* "Le Sommeil et les Rêves," "Revue Philosophique," Octobre, 1879, p. 356.