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TWO PERSONALITIES IN ONE PERSON.

The record books of the medical profession contain not a few reports of patients living double lives: cases in which there is a periodical loss of onephase of mental life and the assumption or resumption of another very different one. For example, an hysterical subject will have a fit, and on coming out of it will be found to have lost all memory of the past. The mental faculties remain unimpaired, but so far as knowledge goes the patient's mind is that of an infant. With more or less delay she will learn to talk, and to read and work, practically beginning life again at the beginning, and sometimes developing a character quite unlike her first one. The physical basis appears to be the same; but the personality is entirely different, with different temperament, different habits, different tastes, and so on.

Matters will continue after this fashion for an indefinite period; and then the patient will go into another fit, emerging just as she was originally. All the life she has lived since the first fit is suddenly wiped out. She can recal none of it; for the time her second life, and it may have lasted years, is annihilated, and the current of her original life flows on as serenely and naturally as if it had never been broken—until another fit sets her back to the end of her second life, which she takes up again in utter unconsciousness of a break in it. And so her existence alternates between two lives entirely distinct and independent of each other, save that the same body serves for both.

Formerly such alternations of consciousness were explained by spiritual or demoniac possession. The body was supposed to be tenanted by two independent spirits; or the patient's soul was from time to time ousted by some other malignant or benevolent soul, as the tempter might indicate. In our more scientific and materialistic days, the spiritual hypothesis has few retainers: the phenomena in question being much more satisfactorily explanable by supposing that the patient's mental life has been carried on wholly or chiefly by one side of her double brain, and that, when the action of that side is arrested by disease, the unused side takes up the intellectual function and continues until another paroxysm shifts the responsibility to the first used side. So the two lives alternate with the alternating functional activity of the two brains: the reason that such lives are always double and never triple or manifold lying in the fact that we have only two independent brain lobes and no more.

The latest case reported of this sort is exceedingly interesting, and peculiar in that there is a loss of continuity in the life only when the state recurs in which the patient's life began. The case is reported at length in the *Revue Scientifique*, by Professor Azam, of Bordeaux, where the patient lives. The patient is a married woman, now about thirty-four years old, and has been living a double life since she was fourteen years old. For brevity, we will call her first state of consciousness and its repetitions, A, and the second state and repetitions, B.

At first B came on at intervals of days, and lasted for a few hours only. Twice it was absent for three years at a time, from the age of 17½ to 20½, and again from 24 to 27. Latterly she has lived the life of B most of the time, A recurring at intervals of two or three months, and remaining but for a few hours. Formerly the transition occurred during some minutes of unconscious sleep following violent pain in the temples; now it is almost instantaneous. In A, the patient has always been quiescent and somewhat morose in disposition; in B, she has always been bright, gay, and affectionate. In A, she has no memory of events which happen in B; but in B, she has a full recollection of her life in both states—a remarkable peculiarity in her case, as already observed. In B, her distress, on discovering that there have been blanks in her conscions experience, is extreme; but the practical inconvenience of such loss of memory, formerly great, has become less with the predominance of B. On rare occasions on passing out of B, the patient suffers a brief period of agitation and extreme terror, during which her knowledge is somewhat disordered; at other times there is no apparent derangement except such as commonly appears in hysterical patients.

In her passage from B to A (Professor Azam remarks), she does not emerge from a dream, for a dream, however incoherent, is always something. She emerges from nothing. The time elapsed may be an hour, or it may be months, it is all the same to her; an entire section of her conscious life has dropped out. "To compare her existence to a book from which some pages have been torn is not enough. An intelligent reader might fill the blank, but she can have absolutely no notion of anything that happened in her secondary state."

A world of curious problems and complications, social, theological, and other, are suggested by such a case as this. Fancy a person on trial for a crime committed in a previous state of which no recollection remains, with no one aware of the criminal's peculiarity: or a woman to find herself suddenly (to her) surrounded by a family of children, owning her as a mother, yet utterly unknown to her! There is a splendid chance for a sensational novelist. And we should like to hear a convention of clergymen discuss this proposition: Suppose a victim of double consciousness to be a saint in A, and a wretched sinner in B. Her earthly existence terminates in B. Will the two states of consciousness be united by the destruction of the conflicting organs of consciousness? Or will two souls remain, to go to their diverse ways? Again, if there is one, and only one, soul to survive, will it be damned for the sins of B, or saved by the faith that illuminated A?

THERMO-DIFFUSION---A NEW PHYSICAL PHENOMENON

It is a well known fact that gases dilate when heated, unless enclosed in space of invariable volume, in which case the action of the heat is manifested by an augmentation of pressure which increases with the temperature. If the space in which the gas is contained communicates with the air, the heat determines the escape of the gas through the orifice, more or less rapidly, but so that, at a certain instant, if the temperature remain constant, equilibrium will re-establish itself, at which time the pressure of the gas within will be precisely equal to the atmospheric pressure without.

This is easily verified in the following manner: In a block of any porous body (Fig. 1), plaster, for example, a cylindrical cavity is made, in which is introduced and fastened the extremity of an open tube, *a b*. The outer end of the tube communicates with a manometer. On the block being heated, equilibrium of pressure will remain maintained constant, the mercury remaining at a level in the branches of the instrument. A modification of this experiment may be made by substituting for the plaster block a vase of porous earth, such as is used in many galvanic batteries (Fig. 2), which is closed by a pierced cork, through which passes the tube, *a b*, connecting with the manometer; or instead of using the cork, the tube may be sealed in position by a little plaster. The vessel may remain empty or be filled with pulverulent material; and whatever the form of the apparatus, the results above described will always be the same, provided dry material be always used.

Fig. 1.

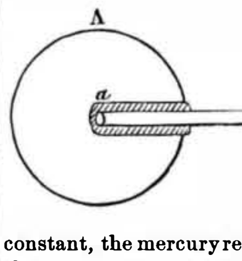
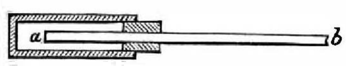


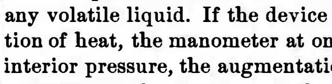
Fig. 2.



If, however, on the contrary, the material be moist, a new phenomenon presents itself, which, as *La Nature* states, M. Merget, of Lyons, has recently discovered, and to which he gives the name of "thermo-diffusion." This apparatus is the same as already described, with the difference, however, that the porous vase or block is previously saturated with any volatile liquid. If the device is then submitted to the action of heat, the manometer at once indicates a difference of interior pressure, the augmentation of which depends on the volatility of the liquid, and the temperature reached. By employing a thermo-diffuser, 4½ inches long by 1¼ inches in diameter, the interior pressure at the limit of dark red heat has been caused to attain that of 3 atmospheres, or 45 lbs. per square inch. This exists as long as the liquid is not entirely evaporated, but ceases as soon as the evaporation is complete, the mercury at once returning to a level in the manometer, regardless of the temperature present. The conditions described as occurring in the dry vase then resume.

This novel phenomenon may be exhibited in still another way (Fig. 3). The manometer being disconnected from the tube, the end of the latter is plunged in water As soon as heat is applied, bubbles of gas are disengaged more or less rapidly. This disengagement is ultimately connected with the evaporation of the liquid, and is uniform as long as the evaporation continues regularly, but stops as soon as the latter terminates. M. Merget indicates, as follows, the conditions which determine variation in quantity of the gas given off. For similar thermo-diffusers, unequally moistened, the volume of gas disengaged varies with the proportion of water absorbed; and for different thermo-diffusers, wet to saturation, the volumes obtained have varied around an average of about 40 times the volume of the apparatus employed. The velocity of disengagement, which augments as the heat increases, depends on the extent of thermo-diffusive surface, and varies in like manner. It has reached several hundred cubic inches per minute with large porous battery vases.

Fig. 3.



M. Merget has likewise established that, in thermo-diffusion, it is the moist porous periphery which is the necessary condition of the phenomenon, and not the difference in hygrometric states of the gases. Two saturated thermo-diffusers were placed under entirely dissimilar conditions, one being located in a thoroughly dry exterior atmosphere, and a wet sponge being placed in the interior of the apparatus, the other having highly heated quicklime within, so that in such a case its interior air might be completely dry. Both, being submitted to a feeble calorific radiation, gave sensibly the same disengagement of gas. If the state of dryness or humidity were the cause of the observed phenomenon, it necessarily would follow in the experiment that the currents of gas would be in inverse direction, which was not the case. Still, even with this fact of the porous vase being a prime necessity established, we are yet without a satisfactory explanation of the discovery. It can only be pointed out that the circumstances may play an important part in certain natural phenomena. After studying the gaseous exchanges between vegetation and the atmosphere, M. Merget concludes that a plant should be regarded as a moist and porous system, possessing the thermo-diffusive activity proper to all similar systems under elevation of temperature.

The leaves of aquatic plants, from this point of view, have considerable activity, and the quantity of gas introduced in the plant may reach 30 cubic inches per minute. A leaf having a long petiole (that of the *nuphar*, for example) was placed in air, while the free extremity of the petiole was placed considerably beneath the surface of water in a test tube. The apparatus being submitted to solar rays, nearly pure atmospheric air passed rapidly under the tube. This took place as if the leaf were a natural thermo-diffuser; and the phenomenon is purely physical in character. The respiration of animals may also be a similar phenomenon; but this has not been sufficiently demonstrated to warrant an affirmative assertion.

The facts of M. Merget's discovery are interesting both from a physical point of view, and in that they tend to explain effects of which the causes are as yet undetermined. They go to show, besides, the mutual interdependence of sciences, the domains of which formerly appeared absolutely distinct.

PRACTICAL INFORMATION FOR PRACTICAL MEN.

The leading article of the *Journal of the Franklin Institute* for August begins with the positive assertion that the general idea that practical information, useful to a practical man, can be made interesting or instructive to the ordinary reader is an altogether erroneous one. And after a six-page amplification of this discouraging thesis, based on the half century's experience of the *Journal*, the writer closes with the sweeping remark that there is an incompatibility, now and for all time, between practical and popular information.

Bearing in mind the warning of an American humorist: "Don't never prophesy unless you know": we would not venture to contradict the *Journal* with regard to the possibilities of "all time;" but for the time that now is, we do not hesitate to say that there is no such incompatibility. And further, an expression of thirty years in trying to meet the popular demand for practical information has given us an abiding conviction that, as in the past, so in the future, in a yearly increasing degree, practical information useful to practical men will more and more be desired by intelligent readers; and the success of periodicals devoted to Science and the arts will hinge more and more—as scientific thinking increasingly prevails—upon their presenting promptly, clearly, and sensibly the very information which the *Journal* asserts to be so essentially unpopular, that is to say, practical information really and truly considered. The impossibility of making attractive to the general reader the stuff which the *Journal* describes as alone worthy of that title, we should not think of doubting. The *Journal* has sufficiently demonstrated that it cannot be done. We doubt whether it could be done even for the ludicrously limited class of men to whom the *Journal* would apply the term practical; in its own words, a few specialists, each of whom "must have acquired, in the course of his practice in some particular direction of knowledge, enough to have compelled him to have learned its 'science,' regularly and methodically, to have investigated by his reasoning faculties and founded himself upon principles and not on half-comprehended facts."

The definition is not very grammatical nor very clear; but we gather from it, and from subsequent remarks, that the practical man must not only be a specialist in scientific investigation, but one so furnished with all that has been accomplished in his particular department that no information can be practical to him unless it is wholly original and presented along with the most thorough and elaborate reasoning and formulæ that may be required for its support and demonstration. "It is the progress and advance of the arts and sciences, not the arts and sciences themselves, that the practical man needs information about;" and the method approved for the presentation of such additions to "practical" knowledge is the dryest and most elaborate possible, albeit the investigation is "tedious," the discussion "recondite," and the concluding results "unintelligible, almost incomprehensible, to any others than practical men in an extremely limited kind of practice."

It is not surprising that the *Journal* finds an incompatibility between such information and popularity: but it *is* surprising to find an editor of intelligence coolly assuming that such information exhausts the limits of the practical, and that no man deserves to be called practical who does not delight in it. The position is sufficiently absurd to be grotesque.

WORKMEN AND THEIR INSTRUCTORS.

A hammer and a chisel are two very simple tools, and surely it seems there can be no great mystery in the use of two such implements; but a foreign language, or the groundwork of a whole science, can be learned in far less time than it takes to learn to chip a piece of metal an inch long so so smoothly upon its surface that the chipping marks cannot be felt. The reason for this difference is simple, and lies in the fact the language or science has teachers who are masters of their subjects, and who make those studies the work of a lifetime; whereas the mechanic has as a rule to work out the whole problem for himself. It is as ridiculous for a man whose ten or fifteen years' experience has included the principles of construction, mathematics, mechanical drawing, etc., to assume to teach that intricate knowledge of manipulation necessary to make an expert workman as it would be for a workman who had spent his leisure time in reading books of science for instruction to attempt to instruct the scientific world; and this would have been made apparent long ago but for the lack of education so common to expert work men, and but that, so soon as an expert workman attains the knowledge of his trade, and the skill in the use of language which enables him to enter the arena of debate or tuition, he ceases to be a workman and becomes too often a stranger to the workmen's interests. Such a faint conception of the real value of an unusually expert workman is possessed by employers that, if he possess such a qualification only, his sphere of usefulness is limited to his practice, and he would search the wide world in vain for a means of giving to others the benefits of his skill by imparting to them the minutiæ of movements, processes, forms, time, speed, etc., which, combined, form that skill which is best known as manual dexterity. There never has been nor can there ever be a piece of expert workmanship done that was not governed by distinct principles and laws; and the misfortune is that they are to a very great extent unwritten laws. Volumes are written for the edification of the workmen that had better far never have had existence. Can the workman do aught but smile at the statement, given under assumed authority, to the effect that tools for cutting wood can be much harder than for cutting iron, or, to state it better, "tools for cutting wood are harder than those usually employed for cutting iron"? And what are we to think of the advice that "the better way to make a scraper" (for flat surfaces) "is to form it like a Venetian stiletto or a beech nut"?

Not long ago, a statement went the rounds of the mechanical press to the effect that a certain French mechanic had discovered a method of reducing the diameters of the tires of locomotive wheels by a process of partial immersion in water: whereas such was the practice twenty-five years ago, and it has been in common use ever since: principles governing the process, together with its application to wheel tires, having been published, together with an illustration, months before in the SCIENTIFIC AMERICAN. Instances of this kind are so numerous that it would take a volume to recite them, nor would the recital bring us any nearer to a solution of the question of how best to impart manual dexterity by means of instruction. Our knowledge of practical mechanics, as commonly applied in our machine shops, is crude in the extreme, and will continue to be so until we have placed within reach of the workman all the intricate knowledge that goes to the very bottom of expert workmanship, which information can only be obtained by practical experiment, made by men chosen by reason of their mechanical skill, under the directions of teachers capable of explaining and formulating the principles and rules governing the practice of the skillful artisan.

BORN SCIENTISTS.

The importance of the innate tastes of an individual being considered in determining the choice of a trade or profession is well shown in Mr. Francis Galton's recent work on the antecedents of English men of science, a volume prepared as a sequel to the treatise on "Hereditary Genius" already reviewed in these columns. Mr. Galton adopted the excellent plan of a well chosen series of questions, which every scientist was requested to answer and return to the sender. One hundred and eighty scientific men were thus questioned, and the replies which most appeal to the thoughtful are those relative to prevalent tastes. We should expect to find a taste for mechanics among the physicists, and such is the case: the same among the mechanicians and engineers. The underlying cause of scientific research may be traced in the repeated mention of the possession of a "desire to know facts," curiously coupled in some cases with a strong repugnance to works of fiction. More interesting, however, is the schedule of influences and motives which urged the various individuals to follow scientific pursuits. Out of 191 people, innate taste for their calling influenced 59; fortunate accidents (generally showing innate taste), 11; indirect opportunities and indirect motives, 19; professional influences to exertion, 24; encouragement of scientific inclinations at home, 34; influence and encouragement of friends, 20; of teachers, 13; travel in distant regions, 8; residual influences, unclassed, 3. The large plurality in favor of innate taste is striking. Now take the various callings: Out of 26 cases of physicists and mathematicians, 12 had an innate taste, 1 no natural taste at all and 7 are doubtful. Of 11 chemists, the taste of 5 was innate, 1 not, and 5 doubtful; of 8 geologists, 7 innate, 1 doubtful; of 24 zoölogists, 17 innate, 3 not, 4 doubtful; of 10 botanists, 8 innate, 1 not, 1 doubtful; of 7 medical men, 2 innate, 4 not, 1 doubtful; of 6 statisticians, 3 innate, 1 not, 2 doubtful; of 5 mechanicians, 2 innate, 3 doubtful.

It is clear from this that a strong and inborn taste for science is both a prevailing and an enduring peculiarity of the persons considered. A fair estimate for Mr. Galton's deductions is that out of every ten men of science, six were naturally gifted with a strong taste for scientific pursuits. Not one person in ten, taken indiscriminately, possessing such an instinct, it follows that its presence must add five fold to the chance of scientific success.

The possession of a special taste for any pursuit is therefore a gift of Nature not to be slighted, and it is in fact something to be seriously studied and its development advanced.

EDUCATED FARMERS.

If we were asked to point out any especial fact as denoting beyond all others our rapid progression in knowledge and in civilization, we should select the strong tendency everywhere manifest to abolish empiricism in all pursuits of life. It is not very long ago that the physician administered his remedies blindly, and knew less of the functions of the heart than does his modern descendant of the spleen and gall bladder. Meteorology, most fickle of all sciences, based as it is on the most changeable of all things, the weather, has within a very few years made marvelous strides; and we are certainly advancing to a point when it will be as easy to foretel the rain and storm of tomorrow as to remember the fine weather of yesterday. Even cookery is no longer to be the science in which unaccurately compounded ingredients, under constantly varying conditions, are supposed by some pleasant fiction to yield invariable results for has not a college been endowed, to educate our future *chefs de cuisine*? Thumb rules in every trade are now scouted by intelligent working men. The world has shaped itself into a gigantic point of interrogation; "why" is the question of the hour, and faith in things earthly is confined only to those who, like the deluded partisans of Keely and others of his ilk, mistake ignorance of that which is possible for belief in that which is not.

Of all the sciences, none within recent years has so quickly emancipated itself from the fogs of empirical conjecture as that of agriculture. Up to the end of the last century even, people believed that air, water, oil, and salts were the sources of plant nutrition. Wallerius, Bergmon, Palissy, Davy, De Saussure, and Sprengel contributed discovery after discovery, investigation after investigation, but their work was scattered and little known outside their laboratories. It was reserved for the genius of Liebig to unite all these fragments of truth; but it was not until 1840 that he produced his great work "Chemistry in its Application to Agriculture and Physiology," and thus gathered in concrete form the materials which are the basis of a now great and rapidly growing science. It is hard to realize that agricultural chemistry has found its application for but 26 years, so clearly are its benefits before us in tangible form. But on the other hand, this only serves to indicate to us how vast must be the results yet to come, when agriculture, through the instrumentality of its knowledge, shall have become in its turn as exact as its sister sciences, and as susceptible of being taught and learnt in the same manner as they. And to attain this much desired end, our schools and colleges, under the guidance of far-seeing men, are doing splendid work.

The youngest of our universities, Cornell, established an agricultural department three years ago, under the charge of Professor Roberts, the farm consisting of 150 acres, in not over good condition. Upon this tract of land the whole science of raising crops, as well as the business of managing a farm, is taught with a thoroughness which we doubt has ever been exceeded. Eighteen square rods of clover, for instance, are set apart for eighteen different modes of treatment with fertilizers. In the experiments with corn, three rows of each kind, or of each mode of manuring, or of the different modes of management in other respects, extend across the field. There are also experimental strips of oats and wheat; and thus every method of cultivation of all the farm products incident to our climate is practised directly before the student, who is required personally to perform the labor necessary in connection therewith. The results of the experiments are carefully recorded and stored away until sufficient shall have been gathered, over a number of seasons, to justify the determining of accurate averages.

Besides this, the students are taught a complete system of accounts. Every hour of labor hired, every product of farm sold, is minutely registered. The food which live stock consumes is recorded on one side and balanced yearly by the market value estimated by a skilled butcher. So that, in this way, the gains or losses, not only of the farm as a whole, but of every branch, are known with the utmost accuracy. Every student is required to become proficient in this account keeping. Each keeps his books separately, and determines estimated values; and as he may sell his own labor to the farm, outside the time required of him, which is but two hours and a half for two days of the week, he is directly interested in the task. Besides the farm, there is a garden of six acres, conducted under the same admirable system; and in addition, lectures on practical agriculture are given four times weekly by Professor Roberts. The *Country Gentleman*, to which we are indebted for these facts, states that the number of agricultural students is still too small, so that there seems to be abundant opportunity for all who may desire to acquire a thorough and most valuable education. Certain it is that such instruction is most urgently needed in this country. It has become too much the fashion for young men to crowd into the great cities, and there to eke out lives behind desks and counters which should be spent in developing the vast resources of the thousands of square miles wherein the richest soil on earth awaits the plowshare. In the Centennial Exposition are exhibited actual glass-enclosed sections of prairie soil with the black unctuous loam extending downwards far below the reach of the deepest furrow. Go look at that superb exhibit in Agricultural Hall, and think of the possibilities which educated farmers cultivating such land might accomplish. Think of it, stalwart young men, who meditate coming into the city after the present harvest is garnered, to find work where there is none to be had. Expend your labor and means at Cornell, Amherst, Dartmouth, and other like colleges, and obtain such an education as we have described then; "go West," pre-empt your land, and start on the high road to independence and ultimate fortune.

Crystallized Glycerin.

Dr. Armstrong recently exhibited, at a meeting of the Chemical Society, London, a specimen of pure crystallized glycerin. The solidification took place while the glycerin was being agitated on a railroad journey in cold weather last winter. Dr. Odling mentioned the curious fact that hydrocyanic or prussic acid is an excellent test for the purity of glycerin, the slightest admixture of any foreign substance causing the glycerin to turn yellow in a short time if a little hydrocyanic acid be stirred into the liquid.