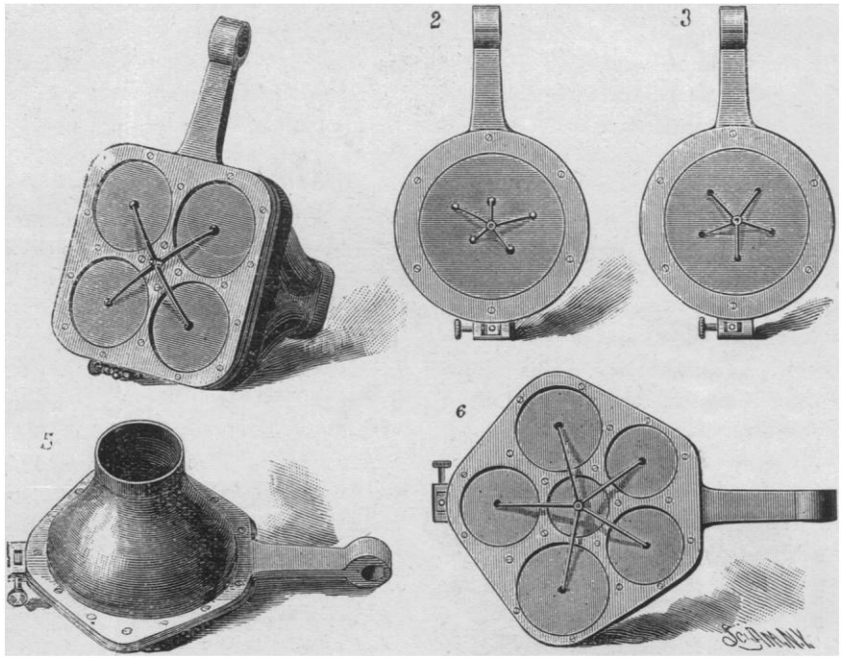
the half-tones, the over-tones, and the intermediate tones. This I am able to demonstrate by mathematical figures.

To recapitulate. In recording articulate speech, or other sounds, I take the vibrations from the body or diaphragm at several points or places, and communicate them by independent conductors to a common point or place, causing the record to be made from this common point or place; and the record thus obtained is a perfect one.

In the reproducing device, instead of a small diaphragm made to vibrate by means of a needle attached in the centre by a point, I have a larger diaphragm (Figs. 1 and 6) divided into several smaller divisions,—three, four, five, or more,—and the vibrations are communicated to these different diaphragms by a spider, having in the centre, on one side, a reproducing needle, and, on the obverse side, legs extending to the centre of each of the smaller divisions.

Thus the method of reproducing articulate or other sound or sounds consists in causing a record of vibration to act at a single point or place, and from this point or place to communicate vibrations by independent conductors to the several diaphragms.



DIAPHRAGMS FOR BETTINI'S MICRO-GRAPHOPHONE.

It is very easily seen that a single diaphragm, which is made to vibrate in the centre by a needle attached to one point, will give a minimum result, because the diaphragm only vibrates, with appreciable result for our ears, in a small part of the centre.

A reproducing diaphragm, with a spider attached by its legs at several points, will vibrate over more of its surface; but the best method is to use a diaphragm with several smaller divisions. The result of several diaphragms vibrating at the same time will naturally give more amplitude to the reproduction.

But this is not the only important end attained by this device. It is very desirable to be able to reproduce the exact natural pitch or tone of the voice or other sound.

As with a number of tuning-forks, some of which will gather vibrations where others will not, one diaphragm, also, will take certain vibrations which others are unable to take on account of differences in tensions, dimensions, and other physical conditions.

In my device, having a diaphragm divided into several divisions of different tensions or dimensions, or varying in other physical conditions, I succeed in giving a more natural reproduction, both in volume and in pitch, because, in case unusual vibrations should be reproduced, I have always one or more diaphragms that will sympathize with these vibrations, and no vibration is lost.

With such devices, the micro-graphophone gives a reproduction for which no hearing-tubes are necessary. The voice and all other sounds are always emitted into the room, still retaining all their natural qualities, and each completely distinct and distinguishable.

The micro-graphophone is shown in perspective in the accompanying illustration. In the base is an electro-motor, which, by means of the pulley shown at the right, drives the horizontal shaft carrying the recording cylinders. The illustration shows the reproducing diaphragm in position. The recording diaphragm is swung back, and is seen at the left of the figure. This recording diaphragm is operated by means of a flexible tube, which, with two of the recording cylinders, appear to the left of the base. The other device shown with these is the planing-tool for smoothing the cylinders preparatory to their use.

GIANNI BETTINI.

THE SOCIETY AND THE "FAD."

IN a very recent issue of a young ladies' magazine (picturesquely called *Poet-Lore*) there lately met my eye the following sentence: "Browning and Ibsen are the only really dramatic authors of their century." As things sometimes strongly suggest their opposites, this sentence reminded me of one of Professor Tyndall's splendid chapters, the one entitled "The Scientific Use of the Imagination;" which chapter quotes as its text the following passage from an address of Sir Benjamin Brodie to the Royal Society: "Physical investigation, more than any thing besides, helps to teach us the actual value and right use of the imagination,—of that wondrous faculty, which, left to ramble uncontrolled, leads us astray into a wilderness of perplexities and errors,—a land of mists and shadows,—but which, properly controlled by experience and reflection, becomes the noblest attribute of man, the source of poetic genius, the instrument of discovery in science, without the aid of which Newton would never have invented fluxions, nor Davy have decomposed the earths and alkalies, nor would Columbus have found another continent."

There is a use of the imagination which is of prophetic value: as, for example, the use which a poet like Goethe makes of it when he foresees, in his poetry, that which the

sciences shall in due time arrange for, and the arts accomplish. Goethe himself expresses this,—

> "Thus in the roaring loom of Time I ply,
> And weave for God the garment thou seest him by."

There is also that nearer use of the imagination which is of immediate commercial importance, as when the promoter of a continental railway sees, in his mind's eye, a location through yawning cañons, and trackless forests on unbeaten mountain-sides, where his locomotives may clamber. And there is yet a third use of the imagination, which discerns enough importance in material and passing things, which to the general reader seem trivial and valueless, to lead the poet to preserve and chronicle them, and so perpetuate that which otherwise would disappear, and be lost forever to the student of humanity and of history. Poetry, then, in the latter case, has its practical as well as its sentimental uses, and it is not a matter of supererogation that organizations of individuals should meet to study and interpret the works of a poet as well as the works of a publicist or a philosopher. But when the poetry of a certain poet, however magnificent, is merely delineation of, or soliloquy concerning, that of which all the race is tenant in common along with the poet, it would seem as if the organization of a great society or a learned academy to penetrate that particular poetry or that particular poet was rather what we call a "fad," or a crochet, than a work of any value to anybody. To illustrate the situation by use of an honored name (to which name I have no wish to allude other than with the highest respect): the death of Mr. Robert Browning has terminated what I think is one of the most wonderful—certainly the most unprecedented—phenomena in literature; namely, the spectacle of a poet writing poetry, and of the simultaneous organization on two continents of learned societies to comprehend that poetry as fast as it was written. Indeed, the remark of the witty person—that, just as great physical works are beyond the capacity of individuals, and so must be intrusted to corporations, so the comprehension of Mr. Browning's poetry, being beyond the single intellect, was committed to aggregations of intellect known as "Browning Societies"—appears to have been less a *bon mot*, and much nearer the truth, than had been generally supposed; for Dr. Furnivall tells us why he founded the original Browning Society. "The main motive for taking the step," says the excellent doctor, "was some talk and writing of a certain cymbal-tinkler being a greater poet (that is, maker) than Browning. I couldn't stand that!" which rather appears to be only another way of saying that Browning was in danger of being neglected, simply because people could not readily ascertain whether there was any thing in him to study; and so that organizations must be formed, not to study something or other that was in him, but to find out if that something or other was there.

What I propose in this paper is an attempt to show, that, unlike the Browning Society, the Shakespeare Society is not an institution of this character, not organized to worship Shakespeare, or to study the Shakespearian method and form: but that it is an institution productive of real benefit, because its purpose is to study the matter (the material) in which Shakespeare deals; because we know that this matter is in him, without the organization of any preliminary parsing societies — simply because, so unapproachably simple and coherent and scientific is his form, that we are able at a glance to ascertain whether he is worth studying or not.

Indeed, it would appear, from this very statement of the founder of Browning societies, that he himself perfectly well understood that a study of Browning merely meant a study of the particular Browning expression, fashion, method, form (or neglect of form, of which Browning himself boasts in his "The Inn Album"). And, if this were the excellent founder's meaning, we can well understand that he was right: for certainly, if Mr. Browning's own contemporary must quarry in Mr. Browning's poetry—must go at him with pick and spade just as a twenty-second century grammarian might do, he must not expect the yield he unearths to be any secret of his own century,—any thing not already his own property in common with Browning himself; any thing he did not know before, or could not have procured with less or equal labor elsewhere,—for certainly Mr. Browning had no sources of information, or access to sources of information, which his contemporaries did and do not enjoy or cannot procure. What the Browning Society occupies itself with, then, must be exactly that which, had Shakespeare societies been organized during Shakespeare's lifetime or immediately after his death, those societies would have been occupied with as to Shakespeare. The Shakespeare societies of 1600–16 would have found themselves in precisely the same position as to their poet as are our Browning societies to theirs. Their aim would have necessarily been, not to learn about their own century, about their own manners, their own customs, their own emotions, sensations, habits and speech, from the writings of one of themselves, but would have been limited simply to a study and interpretation of William Shakespeare's expression of his delineation of those customs, sensations, and emotions.

The Shakespeare Society of our day, as I understand it, has no such purpose as that outlined above. It is not founded and maintained in order to study, still less to worship, either Shakespeare the man, or Shakespeare the expressionist. Still less than either, I may remark in passing, is the Shakespeare Society organized to translate Shakespeare into the vernacular of the nineteenth century. As a matter of fact, Shakespeare's language is actually nearer our own than is that of any writer of any century preceding ours. Attempts to paraphrase usually end in obscuring him. There is not a sentence in the plays the drift and point of which—however an obsolete word, or archaic construction, or typographical error therein, may occasionally baffle us—is not perfectly intelligible. The Shakespeare Society is formed, rather, to study the age and customs in which and among which Shakespeare lived and wrote: the Shakespeare Society, in other words, is an antiquarian society, which has limited its researches to that the most interesting age of the English-speaking world,—the age in which those modern institutions which we prize most—art, manners, letters, society, jurisprudence, the common law which protects all these—were all springing to birth; of which institutions, it seems, William Shakespeare epitomized the very life, fibre, and being; leaving behind him not only a literature for the library and the student, but a record to which

the historian, the politician, the man of science himself, are eager to square themselves. And again: since the dramatic is the highest form of literature, and since Shakespeare made it so, the Shakespeare Society is also a dramatic society, and nothing which is dramatic should be alienated from it. At least, such was the belief of the first Shakespeare Society, founded in London by such gentlemen as the late honored James Orchard Halliwell (since Halliwell-Phillips), John Payne Collier, William Harness, Alexander Dyce, Douglas Jerrold, Bolton Corney, Charles Dickens, Peter Cunningham, Henry Hallam, and others. Harder-headed men than the above enumerated surely never came together; and if any one will take the trouble to look over the titles of the publications of this first Shakespeare Society, he will at least be conscientiously unable to continue to jeer at *that* Shakespearian Society as a mutual admiration assembly. Those publications are entirely devoted to the preservation of such literary matter, records or chronicles, as throw, or threw then, a new light upon the Elizabethan and Jacobean ages, whose central figure William Shakespeare undoubtedly was. I do not know, had "æsthetic criticism" been then invented, whether or not the above-named gentlemen would have succumbed to its temptations; but I find it very hard to imagine that they would have so succumbed. I find it very hard to imagine Halliwell-Phillips and Charles Dickens and Henry Hallam lying "among the daisies, and discoursing in novel phrases of the complicated state of mind" of William Shakespeare. I am quite sure, indeed, that William Shakespeare himself would have been the very last to accept the "creative" or "æsthetic" (it is the same thing) criticism of the present period; which reads all sorts of sublime eschatological and moral moods, motives, and purposes into the few honest, direct, and laborious years which he passed in the busy London of Elizabeth and her successor,—passed there, at first in a struggle to earn his daily bread as a stranger in the crowded streets; then, later, to accumulate a fortune with which, like Horace's ideal gentleman, "far from the noise of trade" to retire to his boyhood's home, and "plough with oxen the fields of his ancestors." Blink the fact as we may:—insist on Shakespeare's moral purposes and immense visions of didactic services to his race as we may: still the fact remains that all the immortal plays were written in the course of this struggle, first for bread and then for wealth, and that William Shakespeare himself was, not only a poet and a dramatist, but a practical mounter of plays, and maintainer of theatres and theatrical companies, and lived and died so utterly unconscious that he had done any thing more than any other playright, that he never made the slightest effort to perpetuate a line he had ever written, and took no notice in his will of any thing but his farms, his curtilages, and his cash. This is no place to give a list of the publications of that first Shakespeare Society; but I happen to recall one of them, a reproduction of the long-lost and forgotten cartoons which Inigo Jones drew in freehand to guide the designers and court carpenters in mounting certain masques for the entertainment of royalty, and this one publication may stand here for all the rest. Not in all those twenty or thirty volumes was there any posing of Shakespeare as a missionary, or dogmatic philosopher teaching moral, or æsthetic, or platonic, or any other sort of doctrines to his race. He (Shakespeare) may be a great moral teacher to-day; but, had he been "a great moral teacher" in his own day, he would have played his companies to empty houses. In short, the purpose of the first Shakespeare Society was, what in my opinion the purpose of every Shakespeare club or society to-day should be: to illustrate rather than supply, and to preserve rather than to create. Here, then, is the point. Shakespeare was, however unwittingly, what we call "scientific" in the use of his imagination, not only because he wrote fully up to the despotic requirements of a stage and a scenic art which he could only imagine (since it was to be born centuries after his funeral), but because he selected for perpetuation, out of his own environment,—out of the riff-raff as well as the splendor, the lewd and vulgar as well as the lofty and the romantic,—that which was formative and genuine, and that of which—because it was formative and genuine, and not illusive and temporary—the centuries beyond him would be interested to study and inquire. Ben Jonson and his associate dramatists were on the ground just as Shakespeare was: they had precisely the access to their contemporary civilization that Shakespeare had; they preserved the fashions and the fads (what Aubrey called "the coxcombities") of their date just as well as Shakespeare did. But, since they were not vouchsafed what Sir Benjamin Brodie calls "the scientific imagination," as well as the romantic and dramatic imagination, they could not and did not know "which seed would grow, and which would not." The Elizabethan dramatists did not, as a rule, it seems, know to which "airy nothings" to give the "local habitation" and "name" which succeeding centuries should found academies and societies to investigate. Glorious as was the age they lived in, their eyes, as a rule, were sealed to the possibilities which were being born around him. Only to one among them was it given to body forth and turn to shapes the forms which should be valuable to posterity,—those actual, practical, and scientific forms which we throng our own theatres to-day to see with our own physical eyes, and which we organize our Shakespeare societies to study and to illustrate.

This, then, is the situation. Because Shakespeare held the mirror up to the nature which environed him, because he became the chronicler of those manners, societies, and civilizations of his Elizabethan day which were the germs of our own, it is worth while to organize societies to study him in every aspect and from every point of view. The Shelley society or the Browning society, on the other hand, has and will have only the form, the expression, the mood, of its poet to investigate and debate; for the material in which Shelley and Browning worked is not unique or personal either to Browning or to Shelley. Their preserve is just exactly the preserve of all other poets:—the Humanities, which are always to the fore, always the same, and always the quarry of contemporary poets. And the poet who appears to-day, or who shall appear to-morrow, will be more apt, I think, to write works which the centuries to come after him shall not willingly let die, if he looks for his society to be organized in those centuries rather than to-day or to-morrow; and this because it is only the centuries to come after him which shall be competent to decide whether his work was fit to live, or was only the thing of the moment,—"the tune of the time," as Hamlet called Osric's flourishes.

Perhaps, in the flood of intellectual commentary and the analysis of Shakespeare's melody, eloquence, and literary style, attention has not been sufficiently attracted to this practical scientific form,—this "local habitation" which Shakespeare gave to his imagination,—how, with this scientific use of his imagination, he actually realized and provided for, not only the possibilities of the stage carpenter (an unknown functionary in his day), but that very modern opulence of modern stage architecture and effect which attracts us to our own theatres. Nobody can fail to be impressed, in witnessing modern Shakespearian revival, with the fact that the costliest and most prodigal of stage mounting which can be lavished upon a Shakespeare play on our metropolitan stage actually requires no amplification, or embellishment, or enlargement of the text, action or situations, to justify it; and that the stage directions of the acting editions of Shakespeare to-day are only those implied, if not expressed, in the text as Shakespeare himself left it. We have seen the splendors of Mr. Rignold's "Henry the Fifth," and of Mr. Booth's and Mr. Wilson Barrett's and Mr. Irving's "Hamlet," "Othello," and "Merchant of Venice," and of Mr. Daly's "Merry Wives of Windsor," "Taming of the Shrew," and "Midsummer Night's Dream;" but it should never be left unrealized that this dramatic author, who—three centuries ago—wrought out this dramatic material, never saw, except in imagination, and without the slightest rudimentary attempt at stage effect to guide his vision, all this machinery which his work to-day, and for our eyes, so imperatively demands.

The stage contrivances of Bottom's company—the man besmeared with loam to represent a wall, the man with a lantern and a dog to represent a moon—were scarcely burlesques upon the meanness and poverty, the petty economies and pitiable makeshifts, of the stage as Shakespeare himself knew it. I was most particularly impressed, in witnessing Mr. Daly's reproduction of "The Merry Wives of Windsor," with Mr. Daly's success in intimating this, without demeaning the effect of his own lavish stage machinery. Of course, the room in Ford's house in which Falstaff meets the ladies was, in the day to be represented, strewn with rushes (about a century was to elapse before interior luxury had even suggested sand). The ceilings were low and the timbers hewn, and the decorations mostly confined to an arrangement of the table utensils: trenchers, tankards, pots, and jugs. But to bring to his audiences the idea of the house of a thriving tradesman who had amassed "legions of angels," and so to tell the story of Falstaff's motives, Mr. Daly, of course, made the room a beautiful interior with carved furniture and wainscotings, and covered the floor with costly rugs. Shakespeare's own plays were not only mounted upon, but were immediately written for, a barren platform, where, if a couch was drawn in to signify a bed-chamber, or a table and two stools to signify an inn taproom, it was the force of a realism which could no further go. It was a company like the clown companies in "Love's Labour's Lost" or the "Midsummer Night's Dream," oftener than a company of Burbadges or of Lowins, that spoke Shakespeare's mighty lines in the ear of Shakespeare himself; and his majestic and noble and tender women were, perforce, intrusted to beardless and callow boys, in days when for a woman to play a woman's part was an ineffable disgrace. The modern stage, at the height of its opulence, is, then, but the imagination and the prophetic mind of Shakespeare; and Shakespeare was not only summit of the dramatic creator, but of the dramatic art as well. Like the projector of the continental railway, who sits in his saddle in the primeval forest and sees his vestibuled palace coaches, and hears his panting locomotives, Shakespeare stood upon his rude stage in the uncouth barn they called a play-house, and foresaw all that three centuries could amass of stage opulence and the lavishness of scenic art; and there and then he devised the situations, and moulded into poetry the dialogue which should describe and justify that opulence and that summit of dramatic art. There and then he bodied forth the form of things unknown—turned them to shapes, and gave to airy nothings a local habitation and a name. I do not say he knew what he saw, or knew that he was so writing for that which was to be his future. I do not know whether he did or not; but the result is here to day.

Certainly this age, and the ages to come, may well organize into academies to study the mind and the workmanship of a man and a poetry like these.

Now, if Shakespeare has a rival; if there is another poet who builds and creates and preserves: and who—with a use of the imagination which we may thus properly call scientific—supplies not only his own generation and contemporaries, but generations yet to be born, with that which is useful (in that it can be acted) and beautiful (in that it can be admired) in poetry,—then let us organize an academy to that poet also; let societies be founded in his honor; and the less time we lose in the work, the better it will be for us. Have we such another poet? Is it Robert Browning? If there is any truth declared, or any discovery announced, in Mr. Browning's poetry, except the ordinary humanities with which all poetry deals,—the loveliness of virtue, the deadliness of vice, etc. (matters rather settled by this time, and as to which further testimony or didactic illustration is merely cumulative),—if there is, then by all means let us have Browning societies, and plenty of them. But if there is not; if it should appear that the great attractiveness of Robert Browning's poetry, the real reason why a taste for it has been sufficient to make it develop into a fad, and why the study of it associates worthy and excellent people into societies and clubs, has always been and is, simply that its meaning is not (like the meaning of Shakespeare's poetry, for example) apparent on its face: that it is not perfectly intelligible, that nouns are situated at long distances from their predicates, and that verbs, adverbs, pronouns, prepositions, and various other parts of speech, are understood from their absence or are to be guessed at from the tumultuous context; should it appear that, were Mr. Browning's poetry paraphrased into perfectly commonplace English, each noun and verb in its place, every substantive and predicate in their proper order, there would be no Browning societies;—then, I submit, it would seem as if Mr. Browning's poetry was and is, nothing but cumulative poetry. And the question arises whether your Browning societies are any thing more than societies for the working out of conundrums, or puzzles, or rebuses; not, perhaps, adult parsing societies, but societies organized to ask what well-known sentiment could Mr. Browning have intended to express in these five words, what perfectly familiar proposition of mor-

als did he mean to restate by those six, etc. I do not by any means say that this is the case, or that Browning is not a great original poet for other reasons than a somewhat complicated syntax. I am only taking the liberty of using him, with the permission of his admirers, as an illustration; just as I have used Shakespeare as an illustration of a poet whose works have lived because (as I think) they are not purely didactic, or purely cumulative of examples of those principles and tendencies with which the world, since the date of its emergence from chaos, has been perfectly familiar.

Is it not a fact, that if, three hundred years from this date, a twenty-second century man should come across one of Mr. Harrigan's dramatic pieces (one of the "Mulligan" series, for example), he would find in it more chronicle of the familiar manners of the nineteenth century than he will find in Mr. Browning's poetry? Should the twenty-second century sociologist or philologist be interested in the city of New York, for example, will he not be more instructed by one of Mr. Harrigan's "Mulligan" plays than by reiterations, however antiquarian their sources, of those truths of human nature with which doubtless his own twenty-second century literature will teem? Men and women are pretty much alike in any century, have always been and doubtless always will be—the same passions, motives, and frailties. The comparative safety of virtue, and perilousness of vice; that goodness is rewarded and badness punished,—are items which doubtless the twenty-second century reader will concede as freely as we do. Nor will a narrative, however distinctly re-teaching those admirable lessons, become solely on that account immortal. The twenty-second century man will doubtless be fairly aware of the average moral probabilities. But, should he be a student of intellectual progress, or curious as to the Browning century, and desire to learn about this nineteenth-century poet's American cousins (to learn about as much of them as Shakespeare has dropped as to his own contemporary Dutchman and Frenchman and Spaniard); should he happen to direct his inquiries as to what were the manners, not of superior persons, but of the general, in the metropolis of the western nineteenth-century world; should he unearth its motley *mise en scene*, where Christian, Jew, and Pagan, where Occidental, Oriental, and African (white, yellow, and black), were all massed in good-natured communion,—he would find in one of Mr. Harrigan's pieces as rich a storehouse of folk-lore, and annotate it as eagerly and as learnedly as we annotate the "Comedy of Errors" or the "Merry Wives of Windsor." He would make notes upon the fact that such interesting ellipses as "Go chase yourself around the block," or "Take a drop, will you?" were an invitation to over-much pretension to descend from its stilts, with quite as much appetite, for example, as we to-day discover that such "sabre cuts of Saxon speech" as "painting the town red,"[1] or to "fire out,"[2] or "to shake,"[3] or "It's a cold day"[4] (meaning a day of disappointment), or "too thin,"[5] are actually resurrections from the Shakespearian day and date.

[Continued on p. 288.]

[1] 1 Henry IV., II. iv. 13.

[2] Sonnet, cxliv. 14; Passionate Pilgrim, ii. 14.

[3] Lear, I. i. 42.

[4] Cymbeline, II. iii.; 2 Henry VI., I. i. 237.

[5] Henry VIII., V. iii, 125.

NOTES AND NEWS.

THE Philopatrian Society of New York have waited upon Provost Pepper of the University of Pennsylvania with a view of establishing a chair in Gaelic at that institution. The question is under consideration.

—The Mexican Government has granted a concession to a company to construct a railroad from a point on the Inter-Oceanic Railway to the volcanoes of Popocatapetl and Ixtaccihuatl, and up the sides of those mountains.

—The United Electric Traction Company has been organized in this city, with a capital of seven million dollars. The new company is virtually a consolidation of all the various Daft electric companies into one central company. This will doubtless give a new impetus to the development of electric traction.

—The American Metrological Society, at a meeting held in Washington last month, advocated the adoption of the metric system by the government for custom house and foreign mail service. The metric system is now used by twenty-four nations in invoicing goods for shipment abroad, and many of them use it for all purposes.

—The council of the Appalachian Mountain Club has issued invitations to a number of persons throughout the State of Massachusetts to a conference, to consider the subject of the preservation of natural scenery and historic sites in that State. The conference will be held at the Massachusetts Institute of Technology, on Saturday, May 24, at 12 noon.

— At the commencement of the Medical and Dental Departments of the University of Pennsylvania, held May 1, there were graduated 117 in medicine and 70 in dentistry. Of these, 3 were from Brazil, 2 from Cuba, 5 from Germany, 3 from Switzerland, 3 from Scotland, and one each from Hayti, Nicaragua, New Brunswick, Prince Edward Island, Nova Scotia, Japan, England, and United States of Colombia.

—Some interesting experiments on the physiology of sponges have been recently made by Dr. Lendenfeld of Innsbruck (*Humboldt*). He operated with eighteen different species, putting carmine, starch, or milk in the water of the aquarium, and also trying the effect of various poisons,—morphine, strychnine, etc. The following are some of his results, as we learn from *Nature*: absorption of food does not take place at the outer surface, but in the interior; only foreign substances used for building up the skeleton enter the sponge without passing into the canal-system. Grains of carmine and other matters often adhere to the flat cells of the canals, but true absorption only takes place in the ciliated cylindrical cells of the ciliated chamber. These get quite filled with carmine grains or milk spherules, but starch grains prove too large for them. Remaining in these cells a few days, the carmine cells are then ejected; while milk particles are partly digested, and then passed on to the migratory cells of the intermediate layer. Any carmine particles found in these latter cells have entered accidentally through external lesions. The sponge contracts its pores when poisons are put in the water, and the action is very like that of poisons on muscles of the higher animals. Especially remarkable is the cramp of sponges under strychnine, and the lethargy (to other stimuli) of sponges treated with cocaine. As these poisons, in the higher animals, act indirectly on the muscles through the nerves, it seems not without warrant to suppose that sponges also have nerve cells which cause muscular contraction.

—The four most valuable minerals found in Persia are coal, iron, copper, and lead, while it has been ascertained that there are large deposits of the purest petroleum in south-west Persia. In the north a coal-field of great extent has been proved to exist in the neignborhood of Teheran. The coal has been tested, and experts affirm that it will bear comparison not unfavorably with the best English coal. Another coal-field of excellent quality has more recently been discovered in the Gisakim Hills, less than fifty miles from Bushire. The total area covered by the coal-fields of Persia is belived to be vast. Nor are the iron mines less promising than coal. Those in the vicinity of Teheran, according to *Bradstreet's*, are very rich, the ore containimg about 70 per cent of metal; and they are situate within half a mile of the coal field.

SCIENCE:

A WEEKLY NEWSPAPER OF ALL THE ARTS AND SCIENCES.

PUBLISHED BY

N. D. C. HODGES,

47 LAFAYETTE PLACE, NEW YORK.

SUBSCRIPTIONS.—United States and Canada.. ..... $3.50 a year.

Great Britain and Europe..... 4.50 a year.

Communications will be welcomed from any quarter. Abstracts of scientific papers are solicited, and twenty copies of the issue containing such will be mailed the author on request in advance. Rejected manuscripts will be returned to the authors only when the requisite amount of postage accompanies the manuscript. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guaranty of good faith. We do not hold ourselves responsible for any view or opinions expressed in the communications of our correspondents.

Attention is called to the "Wants" column. All are invited to use it in soliciting information or seeking new positions. The name and address of applicants should be given in full, so that answers will go direct to them. The "Exchange" column is likewise open.

VOL. XV. NEW YORK, MAY 9, 1890. No. 379.

CONTENTS:

THE SOCIETY AND THE "FAD."

[Concluded from p. 286.]

And this, possibly, may be where the line is to be drawn between the usefulness of a poet or a dramatist to his own generation and date, and his value as an embalmer of manners to generations and dates long beyond him. Indeed, the very first piece of Shakespearian criticism extant[1] (it was written by John Aubrey prior to the year 1680, and I cannot see that the criticism of these two hundred or so years since has practically done any thing more than indorse it) represents Shakespeare in London in his own day, doing just exactly what Mr. Harrigan in New York has done in his. Shakespeare, who wrote "Hamlet," did not scruple to take his auditors into the tavern, the inn-yard, the bagnio, the jail; into the bum-bailiff's and the watchman's court, just as Mr. Harrigan has escorted his audiences into the slums, the opium-joints, the bar-rooms, the ten-cent lodging-houses, to the polls, the picnics, the chowder-parties, and the cheap excursions of the self-respecting newsboy and boot-black. The ears of Mr. Harrigan's audiences are treated less coarsely than were those of Shakespeare. The nineteenth-century theatre-goer takes its Shakespeare extremely Bowdlerized. Doubtless Shakespeare went to a great many places where he should not, and where, had a Shakespeare society for the transcendental illumination of his works kept at his heels, he perhaps could not or would not have gone But it is precisely because he did go to all these places, good or bad, untrammelled, that his pages are of such peculiar value to ourselves: preserving so much that but for him had been misunderstood, but which he recognized as worth the embalming; not minimizing for the sake of ears polite, nor yet distorting into prominence for the prurient, but simply embalming—life-size, as it was, and where it belonged—in the great *comedie humaine* of those matchless dramas. From courtier to courtezan, from commander to camp-follower, the sovereign, the soldier, the statesman, the merchant, the peasant, the clown—how they all talked and walked, and lived and died, Shakespeare has told us. King Henry discusses state-craft with his great ministers; we turn the page, and Pistol and Doll Tear-sheet are hurling Billingsgate at each other, with Falstaff as a mocking peacemaker; two carriers with lanterns are shifting their packs in an inn-yard, and talking of poor Robin, the last hostler, who is dead; another page, and Lady Percy, in Warkworth Castle, is pleading with the noble Hotspur to dwell less upon wars and big events,

> "Of sallies, and retires; of trenches, tents,
> Of palisados, frontiers, parapets;
> Of basilisks, of cannon, culverin;
> Of prisoner's ransoms, and of soldiers slain,
> And all the currents of a heady fight"—

and to give some thought to wife and home and family. And in every one of these thirty-seven dramas there is the same rush of movement, the same panorama of life, of color, and of action, untrammelled and uninterfered with by any slightest hint that the poet preferred or enjoyed any one movement, class, or color, or life, to any other,—a simple photograph—and a negative untouched! And still from out this panorama may biographies be written, and still histories and sociologies unfolded, simply because this negative has not been tampered with. Here, too, is a faithful transcript of the progress of the date of the procession in which Shakespeare was marching along with the rest; and it is worth our while to pause a moment for an example of it. Observe that in the first quarto of "Hamlet" (1603) we have a stage direction, "Enter King, Queen, Corambis, and other lords;" in the second (1604) this entry is directed to be accompanied with "trumpets and kettle drums;" but, in 1623, the words "Danish March" are added to this stage direction. Here is a steady progress in realism: the play being Danish, the march was to be Danish also. Again in 2 Henry VI., in its first quarto form ("*The Contention*," etc.), 1594, Suffolk says to his captor,—

> "Hast thou not waited at my trencher,
> When I have feasted with Queen Margaret?"

But in the folio some thirty years later, Suffolk says,—

> "How often hast thou waited at my cup,
> Fed from my trencher."

This is a step in table etiquette. It came to be only the servant, and not the nobleman, who used the trencher. The

[1] "He did gather humours of men daily, his comedies will remain witt as long as the English language is spoken, for that he handles *mores hominum*. He took in the humour of the constable at Grendon-in-Bucks which is on the road from London to Stratford."

procession marches past us,—the lewd, the unpleasant, the coarse: along with the noble, the stately, the refined. It is all in perspective, and the perspective of Shakespeare is the perspective of history.

And so: because these pages of Shakespeare are crowded with data for the student of civilization: are not a single phase (much less a phrase)—of literature—not puzzles or rebuses to find the meaning of which is beyond the single intellect, but for which societies and clubs and guessing-parties must be formed: therefore it is that a society for the illustration of Shakespeare, and of the field of research which his name implies, is not the fad or fashion of the moment. Its work is not to worry and debate and wrangle as to the meaning of this or that or the other, ellipsis: or as to what truth of human nature the poet intended to refer in this or that or the other, monologue, or cryptogram, or episode, or epigram: its work is simply to trace, from the cues they find in the plays of Shakespeare, the origin of things now familiar, of institutions now important, and of customs still fraught with significance. So long as there is a substance to work, let us have the society and the academy to work it. It matters not much if the student's exuberance overbear him, or his commentary burst into apotheosis: what it behooves him, rather, to beware of, is a confounding of the scientific uses of the imagination with that considerable over-use of the imagination which in time becomes the febrile, not the scientific vision To see the Spanish fleet which is not yet in sight requires only faith. It will materialize with patience; but—for those who see insight and introspection and dramatic power in whatever is beneath their analysis, in whatever they cannot parse, or (and I am not now speaking of Mr. Browning) which offends the ear polite—not faith, but the faith-cure, is the proper specific. Cumulative poetry may have its uses, but it is hardly worth while to organize societies to discuss it.

I beg to repeat that I have only used Mr. Browning and his poetry as illustrations, in this paper. I am very far from wishing to be understood as implying that both are not great, or that I do not honor the memory of the one or admire the majestic qualities of the other. Still less do I propose attempting prophecy on my own account, by asserting that in three centuries, or one century, from this date, great societies and colleges will not be incorporated to sit at the feet of Robert Browning's poetry, and to write volumes of æsthetic criticism, and to fill libraries with controversial biographies of Mr. Browning.

Not to make too much of the pronouncement, then, in the young ladies' magazine picturesquely called *Poet-Lore*,[1] that "Browning and Ibsen are the only two really dramatic authors of this century," it is as good a text, perhaps, as any other upon which to protest, not against the fad poetic (which is an institution, that, with one excuse or another,—Browning, Tolstoi, or Ibsen,—is, like the poor, always with us), but against this cruel misuse of the word "dramatic," and this (perhaps I may call it) over "bumptious" employment of the prophetic vision, which magnifies our own taste of the moment into a judgment as to the probable opinions of posterity.

Certainly Browning is a dramatic poet, if writing plays that cannot be acted constitutes one a dramatic poet. (The answer to this is, of course, that Browning's dramas have been acted: an equivalent argument would prove that women are men, because, once in a while, certain women have acted like men.) And as to Ibsen: well, one swallow makes a summer—sometimes; and the Ibsen craze is some weeks old already. As to the almost forgotten Tolstoi: if what is called "realism" is dramatic, then Tolstoi, like a photograph, is dramatic. Certainly, in this view, a photograph is more dramatic than an oil painting. But one is perhaps to be allowed his taste in photographs? One might, for example, prefer a photograph of I is mother or of his lady-love to a photograph of a dog fight or a pig-sticking; though the latter, of course, everybody would pronounce much the more dramatic. The fad poetic, in itself, is perfectly innocuous: the only possible danger is, that young persons are often led by it into the belief that any thing which is unpleasant or repulsive, or which has the taste of forbidden fruit,—any thing, in short, with which literature as a rule does not deal largely, or as to which the less said the better,—is dramatic. It is because I believe in the Shakespeare Society, and because it is to be feared that the Shakespeare Society (as an Institution) may be thoughtlessly confounded, in the minds of some, with this fad poetic (as an Institution), that I have attempted to here briefly dwell upon a few points wherein they differ.

Let us repeat. There is much that is coarse in the panorama of Shakespeare: but it is there, in its place, and does not dwarf the rest; nor is it the coarseness, any more than (to speak mildly) any other single feature of his dramas, which has made Shakespeare immortal. What is dirty is not on that account dramatic; it certainly is not on that account scientific. We may all of us enjoy Brown, Jones, and Robinson; but, keenly as we may enjoy them, Brown, Jones, and Robinson are not, from the mere fact that we do enjoy them yet (I quote again from the young ladies' magazine), "the only really dramatic poets of the century." As to that, it would seem rather the province of the centuries which come after Brown, Jones, and Robinson, to judge.

I believe that the great verdict as to who are, and who are not, great, - great poets, great dramatists, great masters of any art,—whose mortal labors deserve and justify and satisfy the founding of great societies,—are always, always have been, and always will be, based upon some such proposition as has been considered here. I believe that any thing which survives its own century must have something of the practical (of the scientific if you will) about it—even if it be a work of the imagination pure and simple. I believe that the verdict of the centuries as to who are, and who are not, dramatic poets, will be always based on just such tests as the centuries so far have applied to William Shakespeare. Were the "shapes" to which his pen turned "things unknown" actual and practical? Have we seen them with our own physical eyes? We know that the pages of Shakespeare have stood these tests, and that they have proved Shakespeare's poetry to be an orderly, symmetrical, proportionate, and absolutely true, chronicle of his own age and vicinage: not lifted into the clouds beyond the realm of human nature's daily food; glorified by an imagination none the less superb because not hectic,—an imagination which "bodied forth" forms, not chimeras; and truths, not fantasies. And I believe that it is because Shakespeare is the poet of the true

[1] March, 1890.

and the living, rather than of the didactic and the transcendental, that he is perennial and immortal.

APPLETON MORGAN.

LETTERS TO THE EDITOR.

**** *Correspondents are requested to be as brief as possible. The writer's name is in all cases required as proof of good faith.*

The editor will be glad to publish any queries consonant with the character of the journal.

On request, twenty copies of the number containing his communication will be furnished free to any correspondent.

Kiowa County, Kan., Meteorites.

A REMARKABLE fall of meteorites of unknown date in Kiowa County, Kan., has recently been brought to the knowledge of the scientific world. Many of the citizens of Greensburgh, the county seat, were aware of the existence of these strange irons, and commonly called them meteoric; but there seems to have been no suspicion of their true character and value. Indeed, until the 17th of March, 1890, a specimen weighing 101.5 pounds had ornamented the sidewalk in front of a real estate office in the above-named town for about three years. The farmers in the vicinity of the locality where the fall had occurred had put some of the specimens to various uses

They were first observed by cowboys, long before that portion of Kansas was open to settlement, while it was still a portion of the unrestricted cattle-range of western Kansas. The specimen before referred to, with two others of somewhat smaller size, had been removed from its original location by a cowboy, and buried at the head of a gulch about a mile distant. The cowboy had intended to carry the irons to Green's stage station, about eight miles distant, but was unable to transport so heavy a weight upon his pony. This was in 1885. The town of Greensburgh was laid out in that year, before the close of which the cowboy was taken sick, and died. Before his death, however, he informed two or three citizens of Greensburgh of his burial of the three strange stones. These citizens, about a year later, searched for and found the meteorites, bringing them in to Greensburgh.

Professor F. W. Cragin of Washburn College was the first scientific man who visited the farm upon which these masses had fallen, this visit occurring on March 13. He secured from one of the farmers five meteorites, aggregating in weight over a thousand pounds, the heaviest specimen weighing 466 pounds.

Professor Robert Hay arrived on the spot March 14, but did not obtain any specimens. The writer reached the interesting locality on March 17, and obtained one of the Greensburgh specimens which had just been secured by the farmer. He made a second visit on the 22d, securing the two remaining Greensburgh specimens, thus obtaining all three of the masses which had been removed by the cowboy. He made a third visit March 29, securing two other specimens, which had been obtained by the farmer from his neighbors. The weights of these five specimens are respectively 101.32, 71.50, 54.96, 52.82, and 35.72 pounds. These weights have been accurately determined (except that of the 71.50-pound mass) by the United States standard scales in charge of the Department of Physics in the University of Kansas.

The writer retains the 54.96-pound specimen for the Museum of the University of Kansas, the four others being now in the possession of Mr. George F. Kunz of New York City, who has also secured four of the five specimens obtained by Professor Cragin.

The total number of masses included in this fall was at least twenty. Two of them are in the possession of Professor N. H. Winchell of the University of Minnesota, and several have disappeared from view, either having been mislaid or being still in private hands. The total weight of all the masses must have exceeded two thousand pounds. They fell within an oval area about one mile in length.

The most remarkable point connected with the history of these meteorites is the fact that for five years they should have been know to so many citizens of Kiowa County before the attention of scientific men was directed to them. The wife of the farmer upon whose premises most of them were found persistently maintained that they would prove to be of some pecuniary value. This idea was, however, ridiculed by her relatives and neighbors; but she persisted in retaining control of most of the masses found upon the land pre empted by her husband, until now the proceeds of this "iron from heaven" have cleared the farm from a heavy mortgage, and placed the family in comfortable circumstances.

These masses, during the period preceding their discovery by Kansas scientists, were put to a great variety of ignoble uses. One 75-pound specimen was used to keep in place the cover of a rain-barrel or the door of a cellar; another, weighing 350 pounds, served to hold down the roof of a stable; another, weight 210 pounds, was employed to secure the roof of a dug-out; another had been used with other common rocks to help fill up a hole under a barb wire fence through which the hogs had made their escape from their feeding-ground. This was the 35.72-pound specimen obtained on the writer's last visit, and was secured only after a long and anxious search.

Some of these specimens were only partially buried in the ground; others were struck by the breaking plough at a depth of from three to four inches; others at the second ploughing, five or six inches deep; others yet, by the stirring plough at the third ploughing in a subsequent season.

The specimen retained by the university weighed 54.96 pounds, or 24.93 kilos. It is an irregular plum-shaped mass, much pitted, and covered with a burned and weathered crust. Its extreme length is about eleven inches, and its breath is seven inches. This specimen, as well as the others mentioned above, so far as examined by the writer, belongs to that class of meteoric iron known as "pallasite." It is composed of nickeliferous iron, including many cavities throughout the entire interior. These cavities are filled with troilite and a yellowish, glassy mineral, which is probably olivine. Some of the latter is very dark and less transparent.

The specific gravity, determined by Mr. E. C. Franklin, our assistant in chemistry, and obtained by weighing the whole mass, is 4.76. Two hundred and ninety-three grams have been removed from the larger end of the specimen, and a polished surface of about fifteen square inches has been obtained, which shows very well the structure. The Wiedmanstaeten figures, rather coarse in outline, were developed readily upon the polished iron surface by the application of nitric acid. The portion removed from the specimen is being used for analysis by Professor E. H. S. Bailey and Mr. E. C. Franklin, and the results of the analysis will appear later.

F. H. SNOW.

Lawrence, Kan., May 1.

Experiments with Cave-Air.

GRAND AVENUE CAVE is situated in Edmondson County, Ky., four miles from Mammoth Cave, on the Mammoth Cave Railway, and belongs to the system of great caves which are found in this section of the subcarboniferous limestone formation. Its extent has not been determined as yet, though from three to five miles are opened, showing a magnificent series of the grandest avenues to be found on the globe. The main avenue is about two miles long, and will average 40 feet wide and 30 feet high. This being the highest cave in this section makes it the dryest in the rainiest seasons. The floors are covered with dust; but the absolute dryness of the air is best shown by a small house that was built in the cave some eighteen years ago, the wood, nails, lock, and hinges of which are as sound and bright as when first put in. A self-registering thermometer placed in the cave last November has registered 50° ever since, that being the unvarying temperature. Investigations looking to the use of this cool, dry, and pure air have been in progress for the past six months. A shaft 5 inches in diameter and 225 feet deep was sunk into the cave at a distance of 1,500 feet from its mouth, over which a small experimental building was placed. By means of a small Sturtevant exhaust fan, the air from the cave was brought into the room, and the temperature was reduced from 72° to 59° in less than an hour, thereby showing very clearly that with a large shaft, by which the friction would be greatly reduced, any quantity of this air can be distributed through a large building, thus placing it within the power of the owners to absolutely control the climatic conditions