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No. 2. JUNE, 1909. Vol XIII.

KINGSWOOD COLLEGE MAGAZINE.

Contents.

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Neville Moss

Kingswood College Magazine.

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The Annual Athletic Sports.

Kingswood broke a record this year, in a most unenviable manner; for the first time, we believe, since our institution, it was found necessary to postpone the sports. The date originally fixed was April 28th, which fell on Wednesday, but the earlier part of the week produced so much rain that the track in some places was a veritable quagmire. It was decided therefore to hold those events which did not require the use of the track, and wait until we were favoured by better weather to continue.

This brief spell, however, was quite sufficient to enable D. D. Duncan to set up a new college record. Duncan was somewhat of a surprise in this event as it was thought to be an easy thing for Meth, but a splendid throw of 116 yds. 2 ft. 6in., which was actually considerably farther, for it was a diagonal throw, easily secured the event to Duncan. Three other events were decided on this day, ere the rain came again and Duncan II again distinguished himself by putting the weight a distance of 30 ft. 3 in., 2ft. 6 in. under the record put. F. Deale just won from Meth in the long jump, and also secured the prize for the high jump (under 16).

The following Wednesday was the obverse of the of the other's reverse. A beautiful sunny day, with a

gentle breeze to cool the sun's heat, the track in excellent condition and a fine bevy of ladies to inspire athletic ardour into the competitors.

There were many fine races, the 220 yards open providing a particularly fine finish. F. S. Pascoe got off the mark well, and secured for himself the inner berth, which he held to the end, and running strongly all the way, won by a yard, Meth being second.

The high jump (open) served to set up a new record. Meth, who jumps with surprising ease and grace, cleared 5ft. 6¾ ins., a record of which any college might be proud. We congratulate Meth, who, however, modestly declares that he ought to have done better.

We have yet to take note of another. W. E. Lawton who has the true professional gait combined with the amateur's energy, walked the full mile, in the very creditable time of 8 mins. 31 secs.

O. Vice ran very well in the mile (open), and as he has only attained a slender age, much more should be heard of him in the future.

At the conclusion Mrs. Horace Ayliff distributed the prizes, congratulating the winners in a few felicitous words. The Principal proposed a vote of thanks to the lady for her kindness, and to all those who had contributed to make the event a success, and this vote took the hearty form of rousing cheers.

We append a full list of the results:—

100 Yards (11-12) Drennan, 1; R. Guest, 2.

100 Yards (13-14).—B. Dold, 1; H. R. Drennan, 2.

120 Yards (15-16) handicap.—F. Deale, 1; O. Vice, 2; F. S. Pascoe, 3. Time, 13⅓ secs.

Putting the Weight (16 lbs.).—D. D. Duncan, 1; G. D. Duncan, 2. Distance, 30ft. 3 in.

THROWING THE CRICKET BALL.—D. D. Duncan, 1 ; H. F. Meth, 2. Distance, 116 yds. 2 ft. 6 in. (college record).

LONG JUMP.—F. Deale, 1 ; H. F. Meth, 2. Distance 17 ft. 11 in.

HIGH JUMP (under 16).—F. Deale, 1 ; O. Vice, 2. Height 4 ft. 7 in.

ONE MILE WALKING (Open) HANDICAP.—W. E. Lawton (sc.), 1; J. M. King (60 yds.), 2; J. Meth (70 yds.), 3. Time 8 min. 31⅖ secs. This is also a College record.

HIGH JUMP (Open).—H. F. Meth, 1; F. Deale, 2. Height 5 ft. 6¾ in. This is a college record.

220 YARDS (Open) HANDICAP.—F. S. Pascoe (4 yds.), 1 ; H. F. Meth (sc.), 2. Time 25⅘ secs.

220 YARDS (Under 16) HANDICAP.—F. Deale (sc.), 1 ; O. Vice (2 yds.), 2; L. Transfeldt, 3. Time 26⅘ secs.

HALF MILE (Handicap).—P. C. Curnick (50 yds.), 1 ; W. Tooke (60 yds.), 2; R. Lamplough (50 yds.), 3.

100 YARDS (Open).—J. S. Garrett, 1 ; F. Pascoe, 2 ; H. F. Meth, 3. Time 11 secs.

100 YARDS (9–10).—N. Gane, 1 ; R. Fitchat, 2. Time 14⅕ secs.

INTER-COLLEGIATE : 440 Yards.—R. G. Lotter (S. Andrew's College). Time 53⅘ secs.

QUARTER MILE (Open).—J. S. Garrett, 1 ; J. Logie, 2 ; Time 56⅖ secs.

HOSTEL RACE : 880 Yards (Handicap).—Thompson, 1.

120 YARDS HURDLE RACE.—H. F. Meth, 1; G. D. Duncan, 2. Time 19⅕ secs.

ONE MILE RUNNING (Open) HANDICAP.—O. Vice, 1 ; L. Bayes, 2; E. F. Mears, 3. Time 5 mins. 17⅘ secs.

TEAM RACE.—VI A. (G. D. Duncan, D. Logie, F. Pascoe, N. Sim, L Transfeldt and H. Warner).

Obstacle Race.— Dold.
Three-Legged Race.—Drennan and Ireland.
Consolation Race (Junior) 220 Yards.—Chapman.
Consolation Race (Senior) 220 Yards.—D. Logie.

The Sports Committee desires to thank the following friends for contribution of Prizes or to the Prize Fund :— Miss Ayliff, Rev. J. Metcalf, Rev. R. Matterson, Rev. J. T. Smart, Dr. Dru-Drury, Adv. P. C. Gane, Messrs. H. Ayliff, H. Codner, J. Denoon Duncan, J. Garrett, W. Eltringham, J. W. Bayes, L. B. Dold, C. S. Groves, L. Fennell, J. M. Hope, P. Medley, H. Meth, A. Lawrance, D. Neilson, J. E. Trollip, P. W. Orton, H. Moss, H. Wood, H. Fitchat, M.L.A., R. R. Stocks, Slater & Co., Juta & Co., Birch & Co., Muirhead & Gowie, Stirk & Son, Hepburn & Jeanes, Hamilton & Co., R. Campbell & Son, Ritter & Co., and the W.H.S.

Old Boys' News.

It may be news to some that the subscription for the current year to the O.K.C. is now due ; also that overdue subscriptions should be paid without delay.

The Agricultural College at Elsenburg has a strong contingent of O.Ks. Recent recruits there include R. S. Smith, J. D. Mallet, S. G. Hodges, H. G. Murray, R. L. Armour.

R. B. Main ran in the S. A. Championship meeting at Queenstown on Empire Day, but failed to secure a place in the 100 yards. May fortune favour him on a future occasion.

S. W. Smart played for Grahamstown v. Hamilton F.C. and also for United Colleges against the same Club.

Beginnings of English Drama.

The object of a short article of this nature cannot possibly be more comprehensive than merely to glance at a few of the conditions that went to mould and define the genius of the man whom we call Shakspere. Our thoughts then must not centre round the great orb itself, but must turn away from this and accustom themselves to the comparative blackness that lies without; which done, reveals a number of lesser lights that have a lustre all their own and that never again loose all the brightness when once their true nature has been discovered. Fully to appreciate the character of these minor spheres, and their relation to the greatest, we must attempt to discover how they came there.

Drama appears to have reached its wintry season to-day. It enjoyed a short and glorious summer during classical times, a waning autumn during the Roman era, a chill winter during the early mediæval age, a returning spring during the later mediæval age, a burst of golden sunshine and summer radiance in the years of Elizabeth and James I.—that is to say Shakspere's years,—a vacillating autumn under the later Stuarts and a barren winter to-day. Such in bare outline is the history of the drama.

We look around us and see large placards, glaring red and blue, depicting some murderous scene or deed of infamy, and "Our spirit groans within us," and we are prompted to stigmatise drama in the words of the reverend dramatist, Stephen Gosson, as a "fabrication of the devil." "Ah, what a fall there was my countrymen!" There you have the ragged, tattered ends of a glorious fabric, woven by the finest craftsmen, adorned by human experience, coloured by nature's art and originally devoted to the Highest of the Highest, the Creator himself. Let us examine this further.

Side by side with the fall of Rome, gladiatorial shows took the place of legitimate drama—shows which Nero made hideous by his barbaric treatment of the Christians, using them as torches to illuminate his nightly orgies and to allow the gladiators to breathe fully of that atmosphere which creates human beasts. But as the older physicians bled a man to restore vitality, the blood of these early devotees of the Church flowed to inspire vigour into Christianity ; the flame of the gospel waned, it is true, dimly flickering almost to extinction, but the fire that smoulders is the more ready to burst into flame, and in 313 A.D., under Constantine, freedom of worship was granted.

A difficult problem faced Christianity at this juncture. How was it to combat this taste for gladiatorial shows ? It found a ready and admirable solution—a dramatic substitute was made. The early fathers represented to those under their spiritual care, scriptural incidents in dramatic form. Such an innovation could not fail, and the 9th century saw a fully-developed liturgical drama.

Its origin is easy to conceive. The germ was there already ; for it was the custom amongst the early churchmen to celebrate the birth of our Lord by placing a cradle in the sanctuary, while on either side, the choir would sing suitable music, which soon took the shape of question and answer. One division might ask " Whom seek ye, denizens of heaven ?" and the other would reply, " We seek the Lord." In this manner the whole story of Christ's birth would be dramatically and chorally represented.

The value of dramatic action in education was fully recognised in these early times, and there arose a kindred drama in the monastic schools. The monks wrote short plays which the children themselves acted, and which had not merely a recreative value but also a pedagogic value.

In the church the plays naturally associated themselves with scripture, while in the schools subjects were chosen from the saints, especially patron saints ; the most popular subject in fact was the story of St. Nicholas, who was the particular guardian in the middle ages of scholars, who had far to travel along lonely and dangerous roads, and whose popularity has lived to our day in the person of Santa Claus, the corrupted form of his original name, while his connection with Christmas, our Lord's birthtime is still maintained.

The success of the religious drama called forth a rival species that was purely secular. Farcical shows and buffoonery soon appeared, and jovial companies of "joculatores" quickly discovered that dramatic representations were as profitable to them pecuniarily as they were to the monastic schools educationally, and from such shows it is but a few steps removed to comedy.

In England the drama was late ; it was not until the XI century that it took any shape on the continent. In the XII century people crowded to the City of London to see the church dramas. These were crude in the extreme, but in their very crudity lay their virtue ; they were perfect just because they lacked finish ; they were successful because they were weak. The people of England knew their bible not from reading, but from hearing, and all that we hear is translated by our individual powers of perception or rather apperception, and these dramas construed the scriptures in an essentially popular manner, and in that lay their success. From these simple essays developed a whole cycle of plays dramatising biblical stories from the Creation right down to the pictures of Revelations and beyond to the "crack of doom"—a pet theory of mediæval religious life. These cycles went on right up to Shakspere's

time. Doubtless he saw many of them in the neighbouring town of Coventry, for the life of the people was bound up in these scriptural representations and we may be assured that Shakspere enjoyed to the full the opportunities thus afforded him. When in "A Winter's Tale" little Mamillius creeps up to his mother and begins, "There was a man dwelt by a churchyard," Shakspere surely has in mind his early boyhood and his own recapitulation of the Coventry stories at his mother's knee; at least no too materially-minded critic will begrudge us the pleasing fancy. We add more: it was these Coventry plays that drew forth his inborn genius, that first implanted the happy seed in the fertile soil of his mind that maturer years were to develop into a full glory of magnificent bloom and give to the world a perfect fruit embodied in that which we know by the absurdly prosaic expression as "Shakspere's Works."

The most famed of these cycles are those of York, Chester, Wakefield and Coventry, but there are numerous others, and the fame of those mentioned lies rather in the fact that they have survived to our own times, than in any superior merit of their own. These cycles, or to use the word so greatly in vogue just now, pageants (the word means "scaffolding") were shewn from a very primitive stage. The structure, that could be wheeled from place to place, consisted of two parts; the upper portion was the stage, the lower portion draped around with green baize represented the lower world and abode of the infernal deities in contradistinction to the stage or earth. This lower room or "green room" as it came to be and is still called, though all connection with the original draped chamber is lost, was used as a dressing room for the performers, who were by no means so numerous as to be hampered

by want of space in this small area, as one man played many parts. These pageants wheeled from place to place became very popular, and the biblical characters represented by them became proverbial, in which our ancestors proved themselves more pious than we who only speak of a Micawber, a Pickwick, a Col. Newcome, etc., whereas they typify an argumentative woman, for instance, by Mrs. Noah ; even Chaucer refers to this early characterisation : "Have ye not seen that Noah had great difficulty to get his wife into the ark ?"

Literature has no beginning and no end ; it merely evolves, and the dramatic portion of literature essentially so ; no man can say where it really took its rise and surely no man will be so bold as to foretell its end, for a literature that includes Shakspere among its authors is like a well that is fed from a perennial spring, that may with years of drought, be reduced to a desperately low ebb, but never completely exhausted. Such a source of inspiration must Shakspere ever be to dramatic literature, for the possibilities of this particular branch have been made manifest by his master-hand in such an indisputable manner that the glow shed upon this fair way must from time to time attract other climbers on the upward path.

Shakspere's excellence is his greatest failing ; but then his greatest failing is above most men's success. His predominance in his own sphere minimised by contrast those around him, and to most of us the names of Marlowe, Green, Lodge or Lyly convey nothing, yet the greatness of the master rests upon these comparative obscurities as surely as does the superstructure of a palace rest upon foundations that are unseen and unadorned, or as does the splendid foliage of a giant tree derive its splendour from the gnarled trunk and the errant roots.

We have glanced at the early attempts at drama, at the nature of the treatment of a dramatic subject, of its Christian origin and its secular offshoot, but further developments of these old "mystery" and "morality" plays is seen in the works of the men referred to, and whose work does not deserve to pass unnoticed. We intend, therefore, in a succeeding issue, briefly to survey the works of those who walked in Shakspere's shadow. Coming events cast their shadows before; Shakspere's surely did, for much of the work of these men, would not have disgraced the pages of the greatest.

G.H.W.

Gleanings.

"Blessed is the nation that hath no history." Which may, or may not, be true. Anyhow this term has been an uneventful one, and the gleaner finds very little to glean.

* * * *

Members of the Debating Society are much concerned as to what improvement is mostly needed by the College, and the opinion, though divided, has on the whole expressed itself in favour of a swimming bath. The gleaner gives no secret away when he mentions that there is a plan pigeon-holed somewhere for this same swimming bath, and that the scheme is within the area of practical politics. Of this everyone will hear more anon.

* * * *

There is no time for progressive movements like a time of severe depression. This sounds a little like one of the Dephic utterances of Mr. Chesterton, but it means that if the progressive members of the Debating Society referred to will bring back next term twenty-four promises—backed

in the way promises ought to be—they shall be at once decorated with the "order of the Bath."

* * * *

The mystic letters K.C.B. are often observed on exercise books and elsewhere. Why should the writers not give them an added significance ?

* * * *

Sencea says that the ancient bath was "*in usum, non oblectamentum reperta.*" We have one "*in nsum,*" why not another "*in oblectamentum.*"

* * * *

On May 15th we were visited by Rev. George Lowe of Johannesburg, who had several sons at the College some years ago. Mr. Lowe gave a short but charming address in the schoolroom in connection with his work as Representative of the British and Foreign Bible Society. Other visitors to the College during the quarter have been Mr. Runciman, M.L.A., and Mr. Andrew Black.

* * * *

The only changes in our ranks at Easter were the departure of J. Hollingworth and the arrival of J. Ireland.

* * * *

News from Edinburgh states that G. Chouler (O.K.) has taken First Class Honours in his Hospital Course, and the Medal for Midwifery and Children's Diseases. The doctors, as a mark of appreciation, presented him with a fitted bag of forceps. He is still undecided whether to be a doctor or a dentist.

W. J. Chipps (O.K.) reports that he was married last December, and L. P. Kent that after various wanderings he has reached tne Golden City and commenced a course for chartered accountants.

The re-opening of next term has been fixed for Friday July 23rd, boarders arriving on Thursday, July 22nd.

* * * *

Cadets will be interested to learn that the Bull's Eye is dead, lamented only by the pot-hunter. Militant South Africa has for some while been a good way behind the times on the score of shooting, and not only in its adherence to the Bull's Eye as the best method of teaching musketry from the military stand point. The Bull's Eye is perhaps the one object which gets bigger, the further you get away from it, and though distance may lend enchantment to the view, it should certainly not lend size. It is hoped that Cadet Corps will be instructed to bring themselves into line, and adopt the new methods. Targets of khaki and green with semi-invisible centres are now the order of the day and it must be admitted have common sense on their side.

* * * *

Suggestions have been made for the erection of a 30 yards or Minature Rifle Range. This would be a useful adjunct in the training of recruits, and a means of affording considerable amusement at odd moments. We hope the suggestion may materialise.

Literary and Debating Society.

The general meeting was held on Friday, May 7th, the Chair being occupied by Mr. Gane.

The President was continued in office, by the unanimous consent of all, and Messrs. Ward, Williams and Williamson were elected Vice-Presidents. The secretarial

duties devolved upon the able shoulders of L. Transfeldt, while the Executive Committee was also elected. The programme was drawn up and presents a very attractive appearance.

The 97th meeting was devoted to impromptu speaking. Mr. Ward was in the Chair, and managed to induce the members to display their latent genius to such good purpose that we are like to have many speakers here in the future.

The 98th meeting held in the library took the form of a debate on Universal "Suffrage," Mr. Gane being in the chair. Mr. Williamson moved and Mr. Ward opposed. The expectations of an increase in speakers were fully realised, for most of the members expressed their opinions upon this somewhat comprehensive subject, although many of them found some difficulty in unburdening themselves, and when these did so they reached the very acme of perfection in wit, if it be true that brevity is the soul of wits. The vote went in favour of the "Universalists" by a majority of one.

The Modern Atom.

The subject of the ultimate constitution of matter is one which has occupied the minds of philosophers from the earliest times down to the present.

Indeed so far as modern science is concerned there is perhaps no department of physics which is at present claiming the attention of investigators to a greater extent than the unravelling of this mystery of matter. The Greek philosophers, Democritus on the one hand and Anaxagoras on the other, were led to their respective conceptions of

matter more from abstract causes than as results of experiment. Natural philosophy had not at that time reached the stage when theory and experiment go hand in hand, the one confirming and throwing light upon the results of the other.

These two thinkers held views diametrically opposed to one another, which naturally gave rise to two schools of thought upon the subject.

The followers of Democritus, or the Atomists, held that matter was not infinitely divisible, but that if this division process could be carried far enough, particles, atoms, would ultimately be arrived at which would be incapable of further division. The opposite hypothesis required the entire homogeneity and continuity of matter which could be sub-divided without limit.

The latter theory may be dismissed at once. It made no progress, for, to state only a few objections, it was incapable of explaining even such elementary and well-known properties of matter as compressibility, solution, diffusion, etc., of which the atomic hypothesis gave at least a rational (though merely qualitative), explanation, whereas the continuity theory compelled us to accept these phenomena as simple facts, facts incapable of being accounted for.

To take only a couple of illustrations it is easy to imagine that if matter consists of small particles with interspaces between, compression consists merely in forcing these particles closer together, and that solution is the entry of the atoms of the one substance into the spaces separating the atoms of the other.

In the domain of chemistry also the known laws of combination of the elements necessitates the assumption of an atomic hypothesis for their true explanation, and the

labours of Dalton in reviving the Greek idea and building up his atomic theory are doubtless well known.

Such then was in brief outline the hypothesis of the Atomists, a theory which has long held the field both in physical and chemical science.

Questions soon arose, however, as to the size and properties of this extremely minute body, which no miscroscope could ever hope to reveal, and it became customary to endow it with certain mystical attributes, e.g it was considered infinitely small, infinitely hard, etc., so much so indeed that many scientists expressed themselves heartily sick of a hypothesis on which information was so scanty, and the unfortunate atom was accordingly consigned by them to the realms of metaphysics. About 1870, however, Lord Kelvin commenced a series of investigations with the object of gaining some idea of the size of the atom. It would be apart from the subject to go into the details of his methods here, but it may be stated that as the results of his experiments it was considered that it would take about four million atoms, placed side by side, to make up the length of one millimetre. Or, to use Kelvin's own comparison, " If a raindrop be magnified to the size of the earth, each constitutent atom being magnified in the same proportion, the structure would be more coarse grained than a heap of small shot, but probably less coarse grained than a heap of cricket balls." This statement may at first sight appear to leave rather a large margin for error, but in the measurement of such small magnitudes all that can be done is to assign the limits, upper and lower, between which the magnitudes must lie.

The same thing occurs in the measurement of astronomical magnitudes, and it can no more be said that the sun is ninety-*one* million miles distant from the earth than

that the height of Mount Everest is twenty-nine thousand *and two* feet.

It fell to the lot of a chemist to perfect the atom. It was a chemist who commenced those investigations which led ultimately to very serious doubts being cast upon the integrity of the atom.

The experiments of Crooke's (in 1879), on the passage of an electric current between electrodes sealed into a glass tube exhausted of air, partially at least, are too well known to require a detailed description here.

The appearance of the tube varies greatly with the pressure. At pressures of about 4 c.m. the discharge forms an unbroken column of light, but as the degree of exhaustion increases the column breaks up into striae which commence at the positive electrode and extend almost throughout the tube. As the pressure diminishes still farther the striae disappear, and the luminosity of the column of light diminishes. At the same time, especially if the negative electrode be concave, a stream of light emanates in straight lines (known as the Cathode Stream), from this electrode, and traverses the tube. This stream, where it strikes the sides of the glass excites phosphorescence, the precise colour depending upon the nature of the glass.

Finally when the exhaustion has been pushed as far as possible, say to less than 1 m.m. of mercury, practically all luminosity disappears except for the phosphorescence already referred to. It is in this condition that the discharge has been so much studied, and the following experiments may be taken as demonstrating the essential characteristics of the Cathode rays.

(a). If a hollow metal cylinder, connected with an electroscope, be arranged within the vacuum tube opposite

the Cathode, and so as to catch the rays, the electroscope indicates a negative charge of electricity.

(b). The rays are susceptible to the action of a magnetic, or electrostatic field, which have the effect of converting their straight line path into a curved one, the direction of the latter being such as would be shown by negatively electrified particles.

(c). A small lightly poised wheel with vanes of mica, if suitably arranged in the path of the rays is made to rotate after the manner of a wind-mill.

The above experiments show pretty clearly that it is not an ordinary stream of light we are here dealing with, and Crookes concluded that the rays were minute electrically charged particles in rapid motion, at the same time hazarding the conjecture that he had arrived at a fourth state of matter, and even that he had got in his tube something corresponding to the "corpuscles" contemplated by Newton in his corpuscular theory of light.

Such vague guesses were, however, of little value and physicists soon set themselves to obtain more exact knowledge of those particles which constitute the Cathode rays, and to ascertain in particular whether they were, or were not, matter in the ordinary sense.

If they were not, some very fundamental change must be made in our previous conceptions of matter.

The most important work in this connection has been performed by Professor J. J. Thomson, of Cambridge, and the following is a brief account of some of his experiments on the subject and of the deduction he made from them.

To state the matter briefly the quantities requiring determination were.—The speed of the particles in the vacuum tube, the charge each one carried, and their mass. It is well known that during the process of ordinary electrolysis of a solution, the current is handed on, as it

were, through the liquid by the atoms which are each associated with a charge of electricity. Making use of Lord Kelvin's estimate of the size of an atom, Dr. Johnstone Stoney calculated, many years ago, the charge carried by the hydrogen atom.

This minute charge, than which no smaller quantity of electricity had previously been met with, Dr. Stoney named the Electron, or atom of electricity.

The method adopted by Prof. J. J. Thomson to solve the problem before him was as follows :—

The discharge was allowed to pass through the vacuum tube at a very low pressure, and the phosphorescence at the end of the tube, where the rays struck the glass, was noted. A magnetic field was now applied at right angles to the path of the stream which caused the spot of light to shift its position in accordance with the properties of the rays already laid down. Next an electrostatic field was applied in such a way as to exactly counterbalance the effect of the magnetic, and bring the spot of light back to its original position. Now the radius of curvature of the path in the first case was easily determined from the total amount of deflexion of the rays.

The ratio of the mass of the particles constituting the Cathode rays to their charge was proportional to this radius multiplied by the strength of the magnetic field and divided by the velocity of the particle. The latter velocity having been determined from a comparison of the strengths of the two fields of force, the ratio of mass to charge was finally obtained. This value came out to be nearly one thousandth part of the corresponding ratio for the mass and charge on an atom of hydrogen during electrolysis.

The question now arose—Is this difference due to the smallness of the mass of the Cathode particles or to the greatness of their charge? The difficulty could only be

cleared up by a direct determination of either the mass or charge separately. Nothing daunted, Prof. Thomson proceeded to make this determination, and although the brilliance of his first experiment will be conceded, his second investigation eclipses almost anything that has been done in science during modern times.

But it is necessary here to go back a little in order to fully appreciate the experiment.

In 1880 Mr. John Aitken of Edinburgh discovered that mist or cloud was unable to form in the absence of solid nuclei such as dust particles, and that in perfectly dust free air no such condensation could take place.

On the other hand it had been pointed out by Lord Kelvin that such condensation can take place only on particles of finite curvature, and that whereas a dust particle, which may well contain a billion atoms, is capable of acting as a centre of condensation, an atom is too small for the purpose.

An atom charged with electricity, an ion shortly, is, however, not so handicapped, and it was conclusively shown by J. J. Thomson himself that vapour was capable of condensing on an ion, the charge compensating for its size.

It may be well to point out at this stage the exact meaning of the terms " ion " and " electron " as at present used. The electron is regarded as the fundamental unit of electricity, that charge in fact (as we shall presently see , which was found to be associated with the hydrogen atom during electrolytis, quite apart from the mass of the atom itself ; the unit charge in fact isolated from all matter. The ion, however, is the atom of matter along with its charge. There are many different methods of ionising gases, that is of giving to each atom its appropriate charge, but it will suffice for our purpose, to say that by

the action of Röntgen rays such a condition may be conveniently brought about.

To return now to Professor Thomson's experiment. A given mass of saturated air, ionised under the influence of X rays, was made to condense in the form of a mist by sudden expansion, the ions acting as nuclei.

If, now, it were possible to count the number of drops formed, and knowing the total quantity of electricity within the vessel, it would be possible to deduce the charge on each ion.

Incredible as it may appear this "counting" process was actually carried out in the following manner:—

The cloud having formed it began slowly to descend, its speed of descent ultimately reaching a terminal value, which was accurately measured.

Now it had been shown by Stokes that the limiting speed of fall of such particles as constituted the mist was proportional to the square of their radius. Here then are all the data necessary for determining the size of each drop, and the total quantity of vapour present being known it was a simple matter to calculate the number of drops, and therefore the number of unit charges or electrons. Dividing this latter number into the total charge of electricity the charge on the electron was finally obtained.

It was found to be equal to the charge on the hydrogen atom already referred to, and since the ratio of mass to charge in the case of the electron had been shown to be one thousandth part (nearly) of the corresponding ratio in the case of the material atom, it followed at once that the mass of the electron was one thousandth of the mass of a hydrogen atom. Here then was a discovery of the greatest importance for it showed conclusively that it was possible to have particles of matter, smaller even than Dalton's

unit, and which were capable ef simulating the properties of matter, inertia in particular, in no small degree.

A new theory of matter is demanded and the view taken at present is that the properties of matter may be explained entirely on an electrical basis, and that the mass of the electron is due solely to the charge it carries.

It is certain that a charged body possesses an excess of inertia over a similar body uncharged. Imagine, for instance, a small sphere of electricity in rapid motion in a straight line. The space around the sphere is the seat of a magnetic field and to produce any charge in that field by an attempt to alter in any way the motions of the charge, is, by the ordinary laws of electro-magnetic induction, vigorously resisted.

The precise mechanism of the constitution of our hitherto unit of matter, the atom, is a question upon which complete unanimity has not yet been arrived at, although various theories have been put forward. It is generally considered that electrons make up the mass of an atom, the former revolving in orbits about a centre of force after the manner of the planets around the sun, although it is improbable that they obey the law that obtains in the solar system. In conclusion, among the applications of the above theory one of the most beautiful is its elucidation of the well known phenomenon first observed by Prof. Zeeman of Amsterdam, in 1897, and since named after him.

If a ray of light producing a line spectrum, e.g. sodium light, be subjected to the action of powerful magnetic field, each line is split up into two or more components.

Regarding light as due to the rapid vibrations of the electrons in the incandescent vapour, the magnetic field will obviously affect their motion, retarding or accelerating

as the case may be, thus producing a doubling or trebling of the undisturbed single line.

Some such effect as the above was indeed foreseen by Faraday himself, but it is only within the last few years, and as the result of the labours of Prof. Thomson and others that the matter has been placed upon a sound theoretical and experimental basis.

A. A.

Football.

This year's team is exceedingly light, but this deficiency is counterbalanced by its combination and training, and of six matches played, five have been won and one lost, by the narrow margin of a single point. The forwards have done splendid work, especially with the heel, but the backs show a lack of understanding in their passing, but their value is evident from the scores. The team has been well captained by G. D. Duncan, under whose direction some very good tackling has been done.

Kingswood II v. Rhodes II.

This, the opening match was played on the City Lords ground, on April 21st. Rhodes immediately pressed and early opened the score, Hill crossing the line. Our forwards, however then took hold of the game and the failure of the Rhodes' full-back to hold a dropping ball led to the equalisation of the scores, by Pascoe. In the second half, we completely monopolised the game, and full time saw us ahead to the extent of 25 points to 3.

Kingswood II v. Rhodes II.

This match was played on our ground on May 1st, Rhodes having considerably strengthened their team. Knight was absent and Meth filled the vacancy. Rhodes again started off well and Lawrance scored for them. Kingswood soon transferred play to their opponents quarters, and Meth dropped a goal. Even play followed till half-time; too much individual work being apparent among our three-quarters. As in the first match after half-time, our training told, and while Cliff and Transfeldt well held their forward rushes, Vice and Meth crossed their line, the major points being secured on both occasions. Our win by 14 points to 3 was well deserved, if only by reason of perseverance.

Kingswood II v. Albany II.

The match, played on our ground on Saturday, May 8th, was marred by the slippery ground, rain falling heavily. Play was even as a rule, but the result might have been other than a pointless draw, had our forwards heeled more.

Kingswood II v. St. Andrews II.

This match provided a splendid struggle. In the first half, Kingswood found the pushing abilities of the St. Andrews forwards a little too much for them, more weight being required, but we opened the score through Garrett, and Meth converted from a difficult angle. S. Andrew's, however, before half-time dropped a goal, and crossed the line, the full points being secured. Transfeldt crossed the line between the posts, after the resumption and a lead seemed certain, but the kick badly failed. This was the extent of the scoring and the game finished with the score 9 points to 8 against us.

Kingswood II v. Albany II.

This match, played on June 5th, at home, provided us with an easy victory. The game was not of a high order, much of the play being somewhat wild. We scored 20 points without reply.

Editorial Notices.

We acknowledge with thanks the receipt of the following exchanges: *Grey Institute Magazine*, *St. Andrew's College Magazine*, *South African College Magazine*, *Kingswood School Magazine*, *Leys Fortnightly*, *Past and Present*, *South African College School Magazine*, *Dale College Magazine*, *The Newburian*.

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