

Astounding SCIENCE FICTION

VOLUME LX • NUMBER 2

October 1957

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COVER BY EMSH • Illustrations by Freas and van Dongen

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Astounding SCIENCE FICTION published monthly by Street & Smith Publications, Incorporated at 575 Madison Avenue, New York 22, N. Y. Arthur Z. Gray, President; Ralph R. Whittaker, Jr., Executive Vice-President; Arthur P. Lawler, Vice-President and Secretary; Robert E. Park, Vice-President and Advertising Director; Thomas H. Kaiser, Treasurer. © 1957 by Street & Smith Publications, Inc., in the United States and countries signatory to the Berne Convention and Pan American Convention. Entered as second-class matter at the Post Office, New York, N. Y. Subscription \$3.50 for one year and \$6.00 for two years in the United States, Possessions and Canada; \$4.75 for one year and \$8.00 for two years in Pan American Union, Philippine Islands and Spain. Elsewhere \$5.00 for one year and \$8.50 for two years. When possible allow four weeks for change of address. Give old address and new address when notifying us. We cannot accept responsibility for unsolicited manuscripts or art work. Any material submitted must include return postage. All subscriptions should be addressed to Subscription Dept., Street & Smith Publications, Incorporated, 304 East 45th Street, New York 17, New York.

\$3.50 per Year in U. S. A.

Printed in  173 the U. S. A.

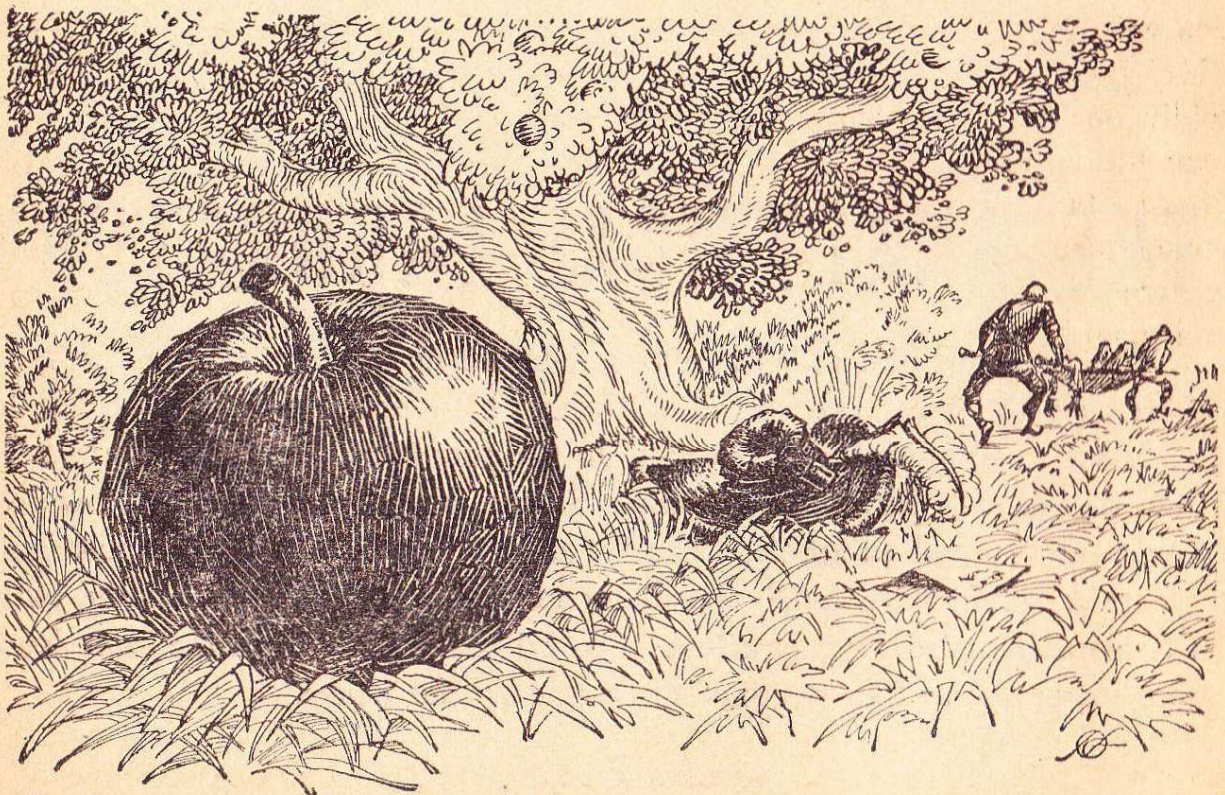
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GENTLEMEN: PLEASE NOTE

Ever wonder what would have happened if the great Isaac had encountered a modern laboratory directorate...?

BY RANDALL GARRETT

Illustrated by Freas



18 June 1957
Trinity College
Cambridge

Sir James Trowbridge
No. 14 Berkeley Mews
London

My dear James,

I'm sorry to have lost touch with you over the past few years; we haven't seen each other since the French War, back in 1948. Nine years! It doesn't seem it.

I'll tell you right off I want a favour of you. (No, I do *not* want to borrow another five shillings! I haven't had my pocket picked again, thank you.) This has to do with a little historical research I'm doing here. I stumbled across something rather queer, and I'm hoping you can help me with it.

I am enclosing copies of some old letters received by Isaac Newton nearly three hundred years ago. As you will notice, they are addressed to "Mr. Isaac Newton, A.B."; it rings oddly on the ear to hear the great man addressed as anything but "your Grace," but of course he was only a young man at the time. He hadn't written his famous *Principia* yet—and wouldn't for twenty years.

Reading these letters is somewhat like listening to a conversation when only one of the speakers is audible, but they seem to indicate another side to the man, one which has not heretofore been brought to light.

Dr. Henry Blake, the mathematician, has looked them over, and he feels that it is possible that Newton stumbled on something that modern

thought has only recently come up with—the gravitational and light theories of the Swiss mathematician, Albert Einstein.

I know it's fantastic to think that a man of even Newton's acknowledged genius could have conceived of such things three centuries before their proper place in history, but Blake says it's possible. And if it is, Blake himself will probably do to Newton's correspondents the same thing that was done to Oliver Cromwell at the beginning of the Restoration—disinter the bodies and have them publicly hanged or some such thing.

Actually, Blake has managed to infect me with his excitement; he has pointed out phrases in several of the letters which tally very well with Einstein's theory. But, alas, the information we have is woefully incomplete.

What we need, you see, are Newton's letters—the ones he sent which provoked these answers. We have searched through everything here at Cambridge, and we haven't found even a trace; evidently the Newton manuscripts were simply discarded on the basis that they were worthless, anyway. Besides, records of that sort were poorly kept at that time.

But we thought perhaps the War Office did a somewhat better job of record-keeping.

Now, I realise full well that, due to the present trouble with the Austro-Hungarian Empire the War Office can't take a chance and allow just anyone to prowl through their files.

It wouldn't do to allow one of the Emperor's spies to have a look at them. However, I wondered if it wouldn't be possible for you to use your connexions and influence at the War Office to look for Newton's letters to one of the correspondents, General Sir Edward Ballister-ffoulkes. You can find the approximate dates by checking the datelines on the copies I am sending you.

The manuscripts are arranged in chronological order, just as they were received by Newton himself. Of them all, only the last one, as you will see, is perfectly clear and understandable in all its implications.

Let me know what can be done, will you, old friend?

With best wishes,

SAM

Dr. Samuel Hackett
Department of History

12 November 1666

London

Mr. Isaac Newton, A.B.

Woolsthorpe

Dear Mr. Newton:

It was very good of you to offer your services to His Majesty's Government at this time. The situation on the Continent, while not dangerous in the extreme, is certainly capable of becoming so.

Your letter was naturally referred to me, since no one else at the War Office would have any need for the services of a trained mathematician.

According to your précis, you have done most of your work in geometry and algebra. I feel that

these fields may be precisely what are needed in our programme, and, although you have had no experience, your record at Trinity College is certainly good enough to warrant our using your services.

If you will fill in the enclosed application blank, along with the proper recommendations and endorsements, we can put you to work immediately.

Sincerely,

Edward Ballister-ffoulkes, Bart.
General of Artillery
Ballistics Research Dept.

12 November 1666

Cambridge

Mr. Isaac Newton, A.B.

Woolsthorpe

My dear Isaac,

I am sorry to hear of your decision to remain at home for a while longer instead of returning to the College, but if you feel that your health is delicate, by all means rest until you are in better spirits.

I think, however, that you should attempt to return as soon as possible; you have a great deal of work ahead of you, my boy. Mathematicians—like Rome—are not built in a day—nor in four years.

If, however, you would like to do a part of your studies by post, I see no objection to it, under the circumstances, although, of course, it will be necessary to spend a part of your time in residence here, and the final examinations will have to be taken here.

Later on, when you are feeling

better, I will send an outline of some work I intend to do on conic sections; I think it would be of great benefit to you to work with me on this. I have always had confidence in your ability. You are young yet, but, given time and plenty of study, you should make a place for yourself in the world of mathematics.

I think that the work I have in mind for you should prove stimulating.

Most sincerely,
Isaac Barrow, Ph.D.

16 November 1666
London

Dear Mr. Newton:

It would most certainly be quite convenient for you to do your work there at Woolsthorpe.

An explanation of the work we are trying to do and some of the problems we are up against will be despatched to you as soon as possible.

Sincerely,
Ballister-ffoulkes

21 November 1666
Cambridge

My dear Isaac,

Your paper has arrived. I haven't had time to look it over yet, but I shall find time to peruse it during the forthcoming holidays. I am, of course, very interested in what problems concerned you during the summer.

A very merry Christmas to you, my boy.

Is. Barrow

GENTLEMEN: PLEASE NOTE

22 November 1666

FROM: Ballistics Research Dept.,
British Army Artillery

TO: Isaac Newton, A.B.,
Woolsthorpe

SUBJECT: Ballistics research data.

ENCLOSURE: Range table sample
for 9-lb. artillery.

2nd ENCLOSURE: Outline and
general discus-
sion of ballistics

1. In order to better understand the problems facing this Department, you will familiarise yourself with the enclosed material.

2. This material is confidential, and is not to be allowed to fall into unauthorised hands.

By order of the Commanding
General

SECOND ENCLOSURE

The purpose of this project is to determine, with as great a degree of precision as possible, the range of artillery used by His Majesty's Armed Forces, and the methods of accurately firing upon targets at various distances from the cannon.

After a great deal of research, the following factors have been found to affect the distance which a cannon ball may be hurled by exploding gunpowder:

1. Weight of the cannon ball.
2. Weight of powder used.
3. Angle of elevation of cannon.
4. Length of cannon barrel.

The first two factors are obvious; the heavier the cannon ball, the

more powder it will take to blow it a certain distance, and contrariwise.

The third is somewhat unwieldy to work with and definitely problematical in its effects. Up to a certain point, increasing the angle seems to increase the range, but after that point is reached, an increase in elevation decreases the range of the weapon. In view of this, it has been decided that all cannon will be fixed at the best angle for maximum range and the other factors varied to change the actual distance the cannon ball is fired.

(Here it may be noted, incidentally, that the angle of elevation is of no use in the Royal Navy, since that angle is indeterminate, due to the roll of the ship.)

The fourth factor, too, may be discarded, since a barrel of too great a length would make it unwieldy on the battlefield, although those of fixed fortresses could be somewhat greater. And, in view of the fact that changing the length of a cannon barrel on the field is out of the question, we may safely say that the fourth factor is a fixed quantity in each cannon and thus ignore it.

It has, therefore, been decided to test each of the various types of cannon presently in use by Army Artillery and publish for each a range table for various cannon balls and charges of powder, and to furnish a copy of such table to the battery leader of each field piece.

This programme, as may well be imagined, has required a great deal of cannon testing in the past year,

and will undoubtedly require a great deal more before the project is finished. We hope, however, that it will be of at least limited use in the very near future, and will eventually greatly advance the science of cannon-firing.

2 January 1667

My dear Isaac,

Your Christmas was, I trust, a pleasant one? I hope your mother is in good health, and I hope your own is improved.

My dear boy, I have some advice for you; I do hope that you will take it as it is intended—as from an old friend and tutor who wishes you only well.

It has come to my attention that you are—shall we say—prostituting your talents. A friend of mine who works at the War Office tells me that you are doing some mathematical work by correspondence—something to do with cannon, I believe.

Now, I quite understand that you are in a somewhat precarious financial position, and believe me, I deeply sympathise with you. I know that the earning of a few pounds can mean a great deal to you in furthering your education.

I do not say that such work is menial, either. I would not have you think that I deplore your choice of work in any way; it is necessary work, and money is certainly necessary for life.

However, let me warn you: a simple task like this, which pays rather well, can become soporific in its

effect. Many men of talent, finding themselves comfortably fixed in a mediocre position, have found their minds have become stultified through long disuse. *Please*, dear boy, don't fall into that trap; don't throw away a fine career in mathematics for the sake of a few paltry pounds. You are young and inexperienced, I know, and have a great deal yet to learn, so please take the advice of one who is somewhat older and wiser.

No, I haven't gotten round to reading your paper yet; I'll do it this evening, my boy, I promise.

Most sincerely,
Isaac Barrow

3 January 1667
Cambridge

My dear Isaac,

I read your paper, and I am, I must confess, somewhat nonplussed. What *are* you doing?

I see that my letter of yesterday was somewhat premature; I should have waited until I had read your paper, since it is in exactly the same category.

You ask: "What is the optimum shape for a wine barrel? Should it be tall and thin, or squat and broad?"

And I ask: "What on Earth difference does it make?"

Surely you are not thinking of becoming a wine merchant? If so, what need is there to waste your time studying mathematics? On the other hand, if you intend to become a mathematician, why should you de-

base a noble and lofty study by applying it to wine barrels?

As I told you, I have no objection to your making a few pounds by doing minor calculations for the Army, but this is foolishness. You have gone to a great deal of trouble for nothing; as you gain more experience, you will realize the folly of such things.

As to your theory of "fluxions," I admit myself to be completely at a loss. You seem to be assuming that a curve is made up of an infinite number of infinitely small lines. Where is your authority for such a statement? You append no bibliography and no references, and I cannot find it in the literature.

Apparently, you are attempting to handle *zero* and *infinity* as though they were arithmetical entities. Where did you learn such nonsense?

My boy, please keep it in mind that four years of undergraduate work does not qualify one as a mathematician. It is merely the first stepping stone on the way. You have a great deal of studying yet to do, a great many books yet to read and absorb—books, I may say, written by men older, wiser, and more learned than yourself.

Please don't waste your time with such frivolous nonsense as toying with symbols derived from wine barrels. No good can come out of a wine barrel, my boy.

I hope you will soon find yourself in a position to aid me in some of the calculations on conic sections as I outlined them to you in my letter



of the 28th December last.* I feel that this is important work and will do a great deal to further your career.

With all best wishes,
Sincerely,
Isaac Barrow

* This letter was either lost or returned to Dr. Barrow.—S. H.

5 January 1667
London

Dear Mr. Newton:
Thank you for your tabulations

on the seven-pounder. I must say you were very prompt in your work; there was no need to work over the holidays.

Your questions show that you are unacquainted with the difficulties of manufacturing military arms; I am not at all surprised at this, because it takes years of training and practical experience in order to learn how to handle the various problems that come up. It is something that no university or college can teach, nor can it be learned from books; only



experience in the field can teach it, and you have had none of that.

I can, however, explain our method of approach thus:

Each cannon to be tested is fired with several balls—some of iron, some of lead, some of brass, and some which have been hollowed out to make room for a charge of gunpowder in order that they may explode upon reaching the target. With each type of ball, we find the amount of powder required to

drive the ball five yards from the muzzle of the piece; this is considered the minimum range. (Naturally, with the testing of hollow, explosive missiles, we do not fill them with gunpowder, but with common earth of equal weight. To do otherwise would endanger the cannoneer.)

After the minimum range is found, more balls are fired, using greater amounts of powder, added in carefully measured increments, and the distance achieved is measured off.

This process is kept up until the safety limit of the weapon is reached; this point is considered the maximum range.

Naturally, the weights of different balls will vary, even if they are made of the same metal, and the bores of cannon will vary, too, but that can't be helped. What would you have us do? Make all cannon identical to the nearest quarter-inch? It would not be at all practical.

I am happy to see that you are enthusiastic over the work we are doing, but please, I beg you, wait until you have learned a great deal more about the problem than you have done before you attempt to make suggestions of such a nature.

As to the paper which you enclosed with your tabulations, I am afraid that it was of little interest to me. I am a military man, not a mathematician.

Thanking you again for your excellent work, I remain.

Yours sincerely,

Edward Ballister-ffoulkes, Bart.

9 January 1667
Cambridge

My dear Isaac,

I have known you for more than five years, and I have, I might say, a more than parental interest in you and your career. Therefore, I feel it my duty to point out to you once again that your erratic temper will one day do you great harm unless you learn to curb it.

You take me to task for saying to you what is most certainly true, viz.:

that you are not yet a mathematician in the full sense of the word. You are young yet. When you have put in as many years at study as I have, you will understand how little you now know. Youth is inclined to be impetuous, to rush in, as the saying goes, where angels fear to tread. But better men than yourself have come to realise that the brashness of youth is no substitute for the wisdom of maturity.

As to your other remarks, you know perfectly well what I meant when I said that no good can come out of a wine barrel. To accuse me of sacrilege and blasphemy is ridiculous. You are twisting my words.

Please let us have no more of this name-calling, and get down to more important work.

Sincerely,

Isaac Barrow

12 January 1667
London

Dear Mr. Newton:

Thank you again for your rapid work in tabulating our results. It is most gratifying to find a young man with such zeal for his work.

As I have said before, I am no mathematician, but I must confess that your explanation makes very little more sense to me than your original mathematical formulae.

As I understand it, you are proposing a set of equations which will show the range of any weapon by computing the weight of the ball against the weight of the powder. (Perhaps I err here, but that is my

understanding.) It seems to me that you are building a castle-in-Spain on rather insubstantial ground. Where is your data? What research have you done on cannon-fire? Without a considerable body of facts to work with, such broad generalisations as you propose are quite out of order.

Even if such a thing could be done—which, pardon me, I take the liberty to doubt—I fear it would be impractical. I realise that you know nothing of military problems, so I must point out to you that our cannoneers are enlisted men—untutored, rough soldiers, not educated gentlemen. Many of them cannot read, much less compute abstruse geometrical formulae. It will be difficult enough to teach them to use the range tables when we complete them.

Indeed, I may say that this last point is one of the many stumbling-blocks in the path of our project. More than one of the staff at the War Office has considered it to be insurmountable, and many times I have fought for the continuance of the research in the face of great opposition.

I greatly fear that using any but methods known to be practicable would result in our appropriation being cut off in Parliament.

Again, however, I thank you for your interest.

Most sincerely,
Ballister-ffoulkes

24 January 1667
Cambridge

My dear Isaac,

I am truly sorry I didn't get around to looking over your second manuscript until now, but, to be perfectly truthful, I have been outlining our course of work on conic sections, and had little time for it.

As it turns out, it was all for the best that I did so; it would have been sinful to take valuable time away from my work for such trivialities.

You are still harping on your wine-barrel fluxions and your Army cannon balls. Am I to presume that the whole thing is a joke? Or are you seriously proposing that the path of a cannon ball is related to the phases of the moon? That is rank superstition! Sheer magic! One would think that even a lad as young as yourself would have grasped the basic concept of the Scientific Method by this time.

How have you tested this absurd thing experimentally? Where are your measurements, your data? Your references?

Do not think, my boy, that fame and fortune in the sciences can be achieved by pulling wild hypotheses out of your imagination. There is no short-cut to mastery of a difficult subject like mathematics; it requires years of hard work and study.

As an example of what can happen when one has not learned enough of the subject, look at your own work. You appear to be handling Time as though it were a spatial dimension. You even end up, in several equations, with square seconds! Now, a yardstick will show that a foot up-and-down is the same

as a foot East-and-West or a foot North-and-South. But where can you find a foot of time?

Please, dear boy, use your time to study the things you have yet to learn; don't waste it exploring a nonsensical cul-de-sac.

I will send you the outline on conic sections within the week.

Sincerely,
Isaac Barrow

1 February 1667
London

Dear Mr. Newton:

In reference to your letter of 14 January 1667, on the simplified algebraic formulae for the prediction of the paths of cannon balls, our staff has considered the matter and found that not only is your mathematics incomprehensibly confusing, but the results are highly inaccurate. Where, may I ask, did you get such data as that? On what experimental evidence do you base your deductions? The actual data we have on hand are not at all in agreement with your computations.

Men with more experience than yours, sir, have been working on this problem for several years, and nothing in our results suggests anything like what you put forth. Finding data is a matter of hard work and observation, not of sitting back in one's armchair and letting one's mind wander.

It would, indeed, be gratifying if our cannon would shoot as far as your equations say they should—but they do not. I am afraid we shall

have to depend on our test results rather than on your theories. It is fact—not fancy—which is required in dealing with military operations.

Sincerely,
Edward Ballister-ffoulkes, Bart.
General, Army Artillery

3 February 1667
Cambridge

My dear Isaac:

I feel it would clear the air all round if we came to an understanding on this thing. Your continued insistence that I pay attention to theories which have no corroboration in the literature and are based on, to say the least, insufficient confirmatory data, is becoming tedious. Permit me, as a friend, to show you where, in your youthful impetuosity, you err.

In the first place, your contention that there is a similarity between the path of a cannon ball and the motion of the moon is patently ridiculous. I cannot imagine where you obtained such erroneous information. A cannon ball, when fired, strikes the earth within seconds; the moon, as anyone knows, has been in the sky since—according to Bishop Ussher—4004 B.C. Your contention that it remains held up by a force which pulls it down is verbal nonsense. Such a statement is semantically nothing but pure noise.

You state that the path followed by a cannon ball is parabolic in nature. How do you know? Can you honestly say that you have measured the path of a cannon ball? Have you traced its path, measured it, and

analysed it mathematically? Can you prove analytically that it is not an hyperbola or part of an ellipse? Have you any data whatsoever to back up your statements, or any authority to which you can refer?

You make broad generalisations on the assumption that "every body is attracted equally to every other body"; that the earth attracts the moon in the same way that it attracts an apple or a cannon ball. Where is your data? You have not, I dare say, measured the attraction between every body in the universe. Have you checked the variations in apples according to sugar content or the variations in cannon balls with reference to their diameters? If not, have you checked with any reliable authority to see if such work has already been done?

And where did you learn that anyone can just sit down and make up one's own mathematical systems? I am certain that I taught you no such thing. Mathematics, my boy, is based on logical interpretation of known facts. One cannot just go off half-cocked and make up one's own system. What would happen to mathematics as a science if anyone should just arbitrarily decide that two added to two yields five or that two multiplied by two equals one hundred?

You said that the whole thing came to you "in a flash" last summer when you were sitting under an apple tree and one of the fruit fell and struck you on the head. I suggest that you see a good physician; blows on the head often have queer effects.

If you have the data to prove your contentions, and can show how your postulates were logically deduced, then I will be very happy to discuss the problem with you.

As soon as you feel better, and are in a more reasonable frame of mind, I hope you will return to Cambridge and continue with the studies which you so badly need.

Sincerely,

Dr. Isaac Barrow

P.S.: It occurs to me that you may have meant your whole scheme as some sort of straight-faced pseudo-scientific joke, similar to that of another gentleman who bears our common Christian name.* If so, I fail to comprehend it, but if you would be so kind as to explain it to me, I will be only too happy to apologise for anything I have said.

Is. Barrow

* I have no idea who this might be. The reference is as obscure as the joke.—S.H.

8 February 1667
London

Dear Mr. Newton:

I have tried to be patient with you, but your last letter was sulphurous beyond all reason. I may not, as you intimate, be qualified to judge the mathematical worth of your theories, but I can and do feel qualified to judge their practical worth.

For instance, you claim that the reason your computations did not tally with the data obtained from actual tests was that the cannon ball was flying through the air instead of a

12 February 1667

Cambridge

My dear Newton:

You have stretched the bonds of friendship too far. You have presumed upon me as a friend, and have quite evidently forgotten my position as head of the Department of Mathematics at this College.

The harsh language in which you have presumed to address me is too shocking for any self-respecting man to bear, and I, for one, refuse to accept such language from my social inferiors. As a Professor of Mathematics in one of the most ancient of universities, I will not allow myself or my position to be ridiculed by a young jackanapes who has no respect for those in authority or for his elders.

Your childish twaddle about glass prisms producing rainbows—a fact which any schoolboy knows—is bad enough; but to say that I am such a fool that I would refuse to recognise “one of the most important advances in mathematics” is beyond the pale of social intercourse.

Repeatedly during the last few months, you have attempted to foist off on me and others implausible and unscientific theories which have no basis whatever in fact and which no reputable scientist would be foolish enough to endorse. You are not a mathematician, sir; you are a charlatan and a mountebank!

You have no data; you admit working from “intuition” and hypotheses cut out of whole cloth; you cannot and will not give any re-

ASTOUNDING SCIENCE FICTION

vacuum. By whose authority do you claim it would act thus-and-so in a vacuum? Do you have any data to substantiate your claim? Have you ever fired a cannon in a vacuum? For that matter have you ever fired a cannon?

What would you have our cannon-eers do—use a giant-sized Von Guericke Air Pump to evacuate the space between the cannon and the target? I fear this would be, to say the very least, somewhat impractical and even dangerous under battle conditions. I presume a tube of some kind would have to be built between the enemy target and the gun emplacement, and I dare say that by that time the enemy would become suspicious and move the target.

You speak of “ideal conditions.” My dear Newton, kindly keep it in mind that battles are never fought under ideal conditions; if they were, we should always win them.

If you wish to spend your time playing with airy-fairy mathematical abstrusities which have no basis in fact, that is perfectly all right with me. This is a free country, and no one proposes to dictate one’s private life. However, I would appreciate it if you would do me the honor of not burdening my already overtaxed mind with such patent nonsense.

Otherwise, your work with the tabulations has been most excellent; I am enclosing a cheque for £20 to cover your work so far.

Sincerely,

Edward Ballister-ffoulkes, Bart.

liable authority for any of your statements, nor will you accept the reliable statements of better men than yourself.

This unseemly behaviour forces me to exercise my prerogative and my authority in defence of the college and the university. I shall recommend to the authorities that you be refused readmission.

Isaac Barrow, Ph.D.
Department of Mathematics
Trinity College

FROM: 16 February 1667
Ballistics Research
Department, Army
Artillery

TO: Mr. Isaac Newton,
A.B., Woolsthorpe

SUBJECT: Reduction in
personnell

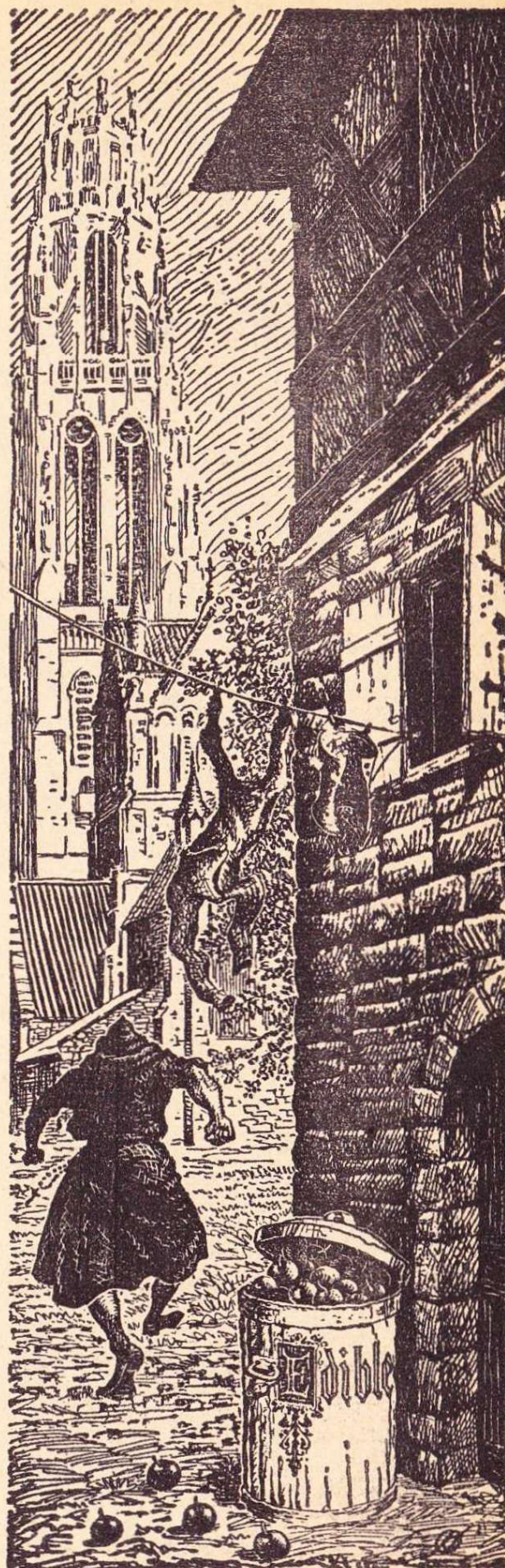
ENCLOSURE: Cheque for
£2/10s/6d

1. In view of the increased personality friction between yourself and certain members of this department, this department feels that it would be to our mutual disadvantage to continue retaining your services as mathematical consultant.

2. As of 16 February 1667 your employment is hereby terminated.

3. Enclosed is a cheque covering your services from 8 February 1667 to date.

By order of the Commanding
General
Major Rupert Knowles,
Adjutant
for



General Sir Edward Ballister-
ffoulkes

12 March 1667
Whitehall

My dear fellow,

I am making this communication quite informal because of your equally informal method of—shall we say—getting my ear.

I have been nagged at day and night for the past three weeks by a certain lady of our mutual acquaintance; she wants me to “do something for that nice young Mr. Newton.” She seems to think you are a man of some intelligence, so, more in order to stop her nagging tongue than anything else, I have personally investigated the circumstances of your set-to with the Ballistics Research Department.

I have spoken with General B-f, and looked over all the correspondence. Can't make head or tail of what you're talking about, myself, but that's beside the point. I did notice that your language toward the general became somewhat acid toward the last. Can't actually say I blame you; the military mind can get a bit stiff at times.

And I'm afraid it's for that very reason that my hands are tied. You can't expect a man to run a kingdom if he doesn't back up his general officers, now, can you? Political history and the history of my own family show that the monarch is much better off if the Army and Navy are behind him.

So I'm afraid that, our little lady

notwithstanding, I must refuse to interfere in this matter.

CAROLUS II REX

19 March 1667
Whitehall

Newton:

No! That is my final word!

C II R

21 May 1667
Cambridge

My dear Isaac,

Please accept the humble apologies of an old friend; I have erred, and I beg you, in your Christian charity, to forgive me. I did not realise at the time I wrote my last letter that you were ill and overwrought, and I have not written since then because of your condition.

As a matter of fact, when your dear mother wrote and told me of your unbalanced state of mind, I wanted desperately to say something to you, but the blessed woman assured me that you were in no condition for communication.

Believe me, my dear boy, had I had any inkling at all of how ill you really were, I should have shown greater forbearance than to address you in such an uncharitable manner. Forgive me for an ungoverned tongue and a hasty pen.

I see now that the error was mine, and it has preyed on my mind for these many weeks. I should have recognised instantly that your letters to me were the work of a feverish mind and a disordered imagination.

I shall never forgive myself for not understanding it at the time.

As to your returning to the College for further study, please rest assured that you are most certainly welcome to return. I have spoken to the proper authorities, and, after an explanation of the nature of your illness, all barriers to your re-entrance have been dropped. Let me assure you that they are well aware of what such an unhappy affliction can do to unsettle a man temporarily, and they understand and sympathise.

I can well understand your decision not to continue your studies in mathematics; I feel that overwork in attempting something that was a bit beyond one of your tender years was as much responsible for your condition as that blow on the head from that apple. It is probably that which accounts for the fact that serious symptoms did not appear until late in March.

I feel that you will do well in whatever new field you may choose, but please do not work so hard at it.

Again, my apologies,

Isaac Barrow

3 April 1687
York

To His Grace,
The Most Reverend Dr. Isaac
Newton,
By Divine Providence the Lord
Archbishop of Canterbury
My Lord Archbishop,

May I take this opportunity to give you my earnest and heartfelt thanks for the copy of your great

work which you so graciously sent; I shall treasure it always.

May I say, your Grace, that, once I had begun the book, I found it almost impossible to lay it down again. In truth, I could not rest until I had completed it, and now I feel that I shall have to read it again and again.

In my humble opinion, your Grace is the greatest theological logician since the Angelic Doctor, St. Thomas Aquinas. And as for beauty and lucidity of writing, it ranks easily with "*De Civitate Deo*" of St. Augustine of Hippo, and "*De Imitatione Christi*" of St. Thomas à Kempis.

I was most especially impressed by your reasoning on the mystical levitation of the soul, in which you show clearly that the closer a human soul approaches the perfection of God, the greater the attraction between that soul and the Spirit of God.

Surely it must be clear to anyone that the more saintly a man becomes, the greater his love for God, and the greater God's love for His servant; and yet, you have put it so clearly and concisely, with such beautifully worded theological reasoning, that it becomes infinitely more clear. It is almost as though one could, in some mystical way, measure the distance between an individual soul and the Holy Presence of God by the measure of the mutual love and attraction between that soul and the Blessed Trinity.

Your masterful analysis of the relative worthiness of those who have

come to the Kingdom of Heaven on the Day of Judgment is almost awe-inspiring in its beauty. Even those souls which have been cleansed as white as snow by the forgiving Grace of God differ, one from another, and your comparison between those souls and a ray of pure white light striking a prism of clearest crystal is magnificent.

The Church has always held that those whose entire lives have been lived in holy purity and in the Grace of God would hold a higher place in Heaven than those whose lives have been sinful, even though God, in His graciousness, has forgiven them their sins. But no one had shown how this might be so. Your analogy, showing how the white light of the sun may be graded into the colours of the rainbow, ranging from red to violet, illustrates wonderfully how Our Lord will grade His chosen servants on the Last Day, when the sinful souls of the damned are cast into Darkness.

There are other instances, almost too numerous to mention, which show your immense theological understanding and deep thought. So thought-provoking are they that I would not dare to comment on them until I have re-read and studied them carefully, for fear I should show my own shallowness of mind.

It is my belief that your "*Principia Theologica*" will be read, honored, and loved by Christians for many centuries to come.

I shall, of course, write to you further and at greater length on this monumental work.

Praying for God's blessing on you and your work, and for the fullness of God's grace during the coming Eastertide,

I am,

Most faithfully yours,

William Sancroft

By Divine Permission

Lord Archbishop of York

THE END

THE ANALYTICAL LABORATORY

(Continued from page 69)

In any case, the score came out:

STORY	AUTHOR	POINTS
1. Profession	Isaac Asimov	1.82
2. The Best Policy	David Gordon	2.41
3. Divine Right	Lester del Rey	2.58
4. Hot Potato	Algis Budrys	4.00
5. Run Of The Mill	Robert Silverberg	4.36

THE EDITOR.