

The Open Court

A MONTHLY MAGAZINE

Devoted to the Science of Religion, the Religion of Science, and the
Extension of the Religious Parliament Idea

Editor: DR. PAUL CARUS.

Associates: { E. C. HEGELER.
MARY CARUS.

VOL. XXII. (No. 11.) NOVEMBER, 1908.

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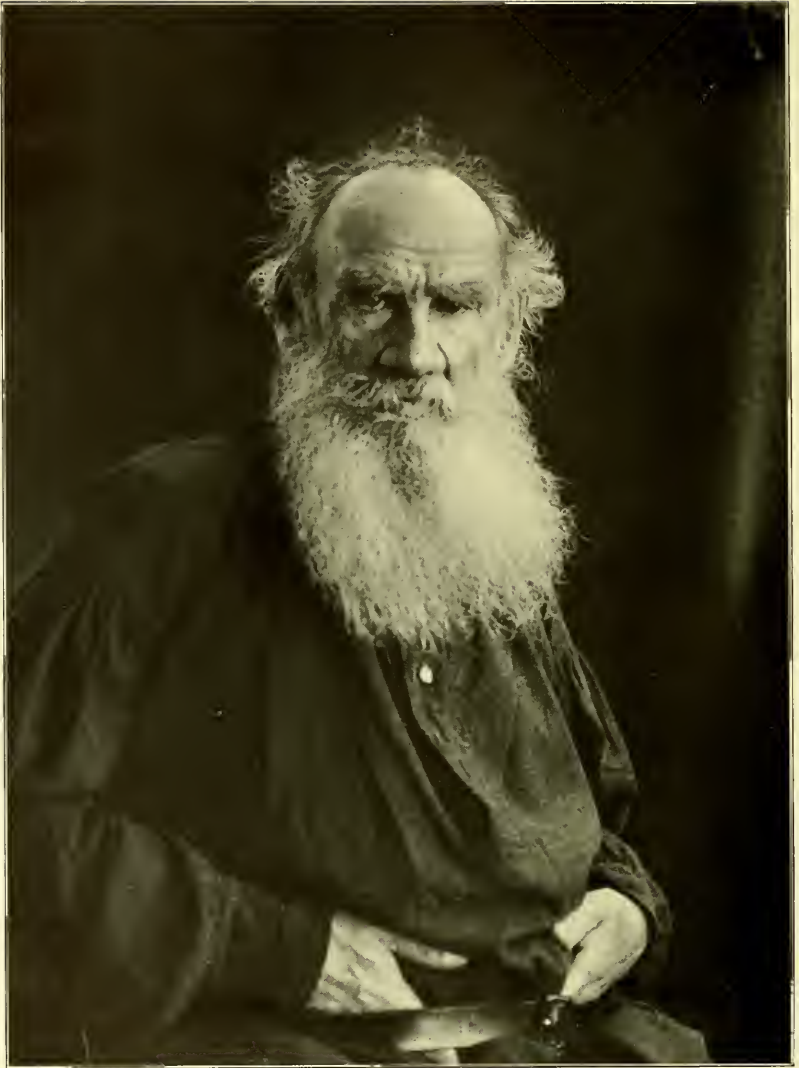
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Leo Tolstoy.
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MINOS AND NIEMAND AGAIN.

BY FRANCIS C. RUSSELL.

READERS of *Alice in Wonderland* are more or less aware that its author was a mathematical professor. They are, however, in general not aware that when it served his turn he could write of mathematics in the same easy and lightsome vein. Those not afflicted with a phobia for mathematics will well relish his *Euclid and his Modern Rivals* in spite of the very weighty matters about which it is occupied. As an object lesson of the advantages of dialogue for the clear and easy presentation of geometrical issues and arguments it is a perfect gem, while the humor with which it is plentifully interspersed makes the reading of it a positive pleasure. I have therefore ventured an imitation, although, of course, one can only tag along after the style of Lewis Carroll. The *dramatis personae* will be the same Minos and Herr Niemand who appear in the book mentioned, and the rôles they severally enact will duly appear in the course of the dialogue.

(Minos *solus*.--Enter Niemand.)

Niemand. I tender here for your favorable verdict a number of booklets entitled "Rational Mathematics" by Dr. Charles De Medici, late of New York City.

Minos. Let me look them over a little. (*Looks a while, and then*) I cannot possibly tell at once what should be said about Dr. De Medici's doctrines and projects. I see that he is a circle squarer, but not a circle squarer of the ordinary kind. His circle squaring is incidental. He projects no less than a radically new system of mathematics, for he proposes to banish altogether from that realm all recourse to irrationals and incommensurables, all recourse to decimal fractions, and to erect a science of mathematics upon the

basis of experimental evidence. That would be an innovation indeed.

Nie. (glowing). That's it. I see you fall to the case exactly. Just think of the marvelous genius of a man who has overruled the resolutions of the intellectual princes of the world, confirmed and re- and re-confirmed by them through millenniums of intellectual history. What a lamentable spectacle it is to see how blind the world, even the so esteemed intellectual world *par excellence*, has always been to transcendent genius. Witness Copernicus, Columbus and other extraordinary men. Is it not enough to make the heart of every enlightened lover of his kind rise up in rebellion against the satisfied conceit of final knowledge that pervades the souls of those who are esteemed in the world as eminent in knowledge, to notice how eager and persistent they are to extinguish and smother every light not kindled at the same brand as is their own? And to notice how the great chump-world *will* follow the counsel of these usurpers and delight to persecute with ridicule, neglect and starvation the vessels of every new revelation? It is the most wonderful of wonders how the world ever gets to know anything of exalted consequence. Everything established seems leagued in a dead set conspiracy against its advent. In fact it is only at vast intervals and by exceptional good fortune that any glint of supreme genius is permitted to penetrate the cordon of malignant jealousy and supine subjection that would foreclose it from its divine mission. For the most part the prevention is successful. Many and many a genius has experienced a beatific intellectual vision, and hence to its service, and to the service of humanity, as a passionate lover bound, has devoted to it his strength and his life, foregoing for its sake all else and enduring starvation, neglect and ridicule, only to the result that the insensate and besotted world had no reception for his discovery, but preferred to wallow rather than fly. Oh! The pity of it! The pity of it! . . .

Min. If passionate oratory were a proper means of letting light in upon the issues that are presented in mathematics, your remarks would be very much in point. That is to say, they would be in point provided they were warranted in their application. Unrecognized and neglected genius is one of the most lamentable cases that can occur, and when it really happens all that you say is well uttered. But how does it apply to the case in hand?

Nie. Why! De Medici and his discoveries have been and are still ostracized. He devoted his life to their elaboration and promulgation and died at last in abject poverty without ever having

had any assurance that his sacrifices and sufferings would be of any avail. Such is the malign fatality that oppresses and suppresses genius. Better be a hod-carrier than to be endued with that affliction.

Minos. By what token or tokens is Dr. De Medici to be recognized as a genius?

Nie. By his mathematical discoveries of course.

Min. But suppose—we can suppose anything you know—suppose that these discoveries turn out to be delusions. Is there anything else to put upon De Medici the *stigmata* of genius?

Nie. I don't know. I never inquired. Why should I inquire when such illustrious marks were conspicuous?

Min. Because the existence of the genius that so stirs your soul with enthusiasm, depends palpably upon the soundness and superiority of the doctrines published and the methods employed by De Medici. Now mathematics is a field of mental exercise that has always proved peculiarly tempting to minds of a soaring proclivity. But it demands and exacts the utmost circumspection and vigor. The paths to success therein are thick beset with sidings fit to mislead even the very elect away from the true line. In multitudes of instances minds of conspicuous excellence have been caught stumbling. Soaring has so universally proved disastrous that every disciplined mathematician is by an insuperable compulsion of his mental nature forced to suspect and challenge any departure from doctrines sanctioned by millions of acute minds ever eager to discover errors and lapses. So constantly and unvaryingly have projected innovations turned out to be fallacious that mathematicians are, in point of fact, a good deal set in the opinion that the accredited body of doctrines is for the most part probably well grounded. If this is prejudice why is it not a prejudice to be commended and counselled? Do you hold that all prejudice is to be renounced?

Nie. Yes. A man that pretends towards the knowledge of things as they really are ought always to keep his mind open and hospitable for a revision of his holdings as well as for new light.

Min. Why then do you solicit my favorable verdict upon De Medici? Do you not want me to become a convert to his system and then and thereafter to persist as a partisan and as an advocate of the same?

Nie. Surely. But the adoption of an opinion or doctrine after marshalling all the available considerations of any considerable consequence and after candidly and carefully weighing the same is not

prejudice. However erroneous it may be, it is nevertheless a well-sanctioned conclusion so far as the investigator is concerned.

Min. That is to say you would have such a conclusion conclude something?

Nie. Of course all well-sanctioned conclusions should be abided in with considerable persistence. How else could any one be said to have any opinions?

Min. Very well. It is a question of your own asking, but all the same very much in point, but its incidence upon your exhortation to always keep the mind open and hospitable for a revision of holdings, seems to me not a little destructive. Now the mathematicians are persons that in a very especial way abide in well-sanctioned conclusions; saving, of course, that deference to a possible better instruction that is the peculiar mark of the scientific spirit. Is it too much on their part to insist that a heavy burden of proof rests with those who would urge that their well-sanctioned conclusions are erroneous?

Nie. Be the burden however heavy it may be, Dr. De Medici has provided ample proofs.

Min. Well, in deference to your urgency I will study the proposals and proofs of Dr. De Medici. Call on me again after a week's interval and I will then report to you my conclusions. I warn you, however, that I shall probably find him a mathematical crank, but that prepossession shall not prevent me from the most candid examination and judgment I am able to compass. And do not think that I mean by crank anything derogatory. I have a decided measure of liking and respect for the general run of cranks, so called. There are, of course, members of their sect that are obnoxious. It is rather hard to be patient and charitable with that combination of conceited ignorance and pig-headed arrogance that we sometimes meet and we feel very much inclined to follow the precept, "answer a fool according to his folly." But in general cranks are men to be noticed with sincere respect if not with honor, for they not only form no little of the really living intellectual plasm of their generation, but they very generally exemplify those traits of character we are proud to appropriate to the capacity of our race. For the most part they are cast in the heroic mould and they refresh us by the contrast they present to the great ovine herd the individuals of which are only just so many copies, machine made, and furnished with machine made characters. These come in and pass, come in and pass, echoing the opinions in vogue and the sentiments approved and no one is wiser or better or has lived any

fuller life for their having existed. But cranks, whatever else they may be, are men of some consequence, be it more or less, in the economy of the world. No one of them can safely be left out of account, for it may turn out that he has been chosen as the vessel of matters of special importance. Their devotion to their visions is touching, and their constancy under indignity and neglect evinces a sincerity and courage that are marks of the superior man. When they succeed the world can see well enough the pathos of their period of probation, but until then they are apt to play the rôle of martyrs. I assure you, that whatever I must conclude as to Dr. De Medici's mathematics, I shall regard him personally as having been at least a man to be noticed with all respect. Come in again a week hence.

Nie. Auf Wiedersehen then.

(Takes leave.)

A Week Later.

(Enter Niemand.)

Nie. Good afternoon, Herr Minos. Are you all prepared to report upon Dr. De Medici's mathematics?

Min. Yes—and no. That is to say, I am as well prepared as I probably ever shall be, but I have found the task I undertook very much more extensive than I anticipated. De Medici not only projected a new system but he provided a new nomenclature and followed a new complex of methods for the embodiment of his system. He appears to me to have been a good arithmetician and an assiduous draftsman, but I should judge that his geometry and algebra were largely self-taught, for he departs widely from the usual definitions, conceptions and phraseology.

Nie. Yes, he proposed to build from the ground up.

Min. The consequence has been that I have had to study a new science or congeries of sciences with a new and strange vehicle for its expression. Moreover, the booklets you provided me are not a full exposition of the new system. The full work was, as he announced, to consist of Sections A, B, and C of three, four, and five parts respectively. Now parts three, four, and five of Section C are lacking.

Nie. Yes, De Medici was so poor that he never was able to print those missing parts.

Min. Did he ever compose them?

Nie. I guess he did. Numerous sheets were found among his

papers after his death that must have belonged to those missing parts, but they have never been edited if indeed they are complete.

Min. Well now, that is very unfortunate, for those very missing parts were to contain the exposition of his Surd Law, and without that his system is very much like a column without a capital.

Nic. But there are a large number of results he proves independently of the Surd Law. In Section B, Part II, he sets forth in articulate form twenty-eight results discovered by him.

Min. Yes, but after all the very head and front of all his discoveries is his discovery that there are no incommensurable quantities whatever. That he plants down as a "Fundamental Axiom." His arithmetic he entitles "Commensurable Arithmetic," and his whole system he calls "Rational Mathematics" for the very purpose of accentuating the contrast it presents with the orthodox system, in consequence of the systematic repudiation of the idea of incommensurable quantities. In short he projects not merely a revolution but a cataclysm. But in proceeding to elaborate his system he meets with divers of the cases that the orthodox school has at least in a measure overcome by their supposition that incommensurables really exist, and by approximations. All such cases met by him he solves by resorts which depend at last for their rational justification upon his unrevealed "Surd Law" and its rational validity. It is hence very inconvenient for me to be obliged to come to a conclusion when a part of the premises is lacking.

Nie. But what say you to that Fundamental Axiom? Here it is Sec. C, part II, paragraph 10: "Any two lines of different lengths have a common measure."

Min. Well, I might say many other things, but I will here content myself with asking: What is the common measure of the side and diagonal of a square?

Nie. Had you just turned over a few pages to paragraph 23 you would have seen his solution. The common measure is $\frac{1}{577}$ th of the side. Shall I read you what he says?

Min. If you please.

Nie. (Starts but stops and hesitates.)

Min. Yes, I understand. You find that he says, "This common measure *will be shown later on*" to be the fraction $\frac{1}{577}$. Now find for me, if you please, this promised "later on" showing.

Nie. (Turns over the pages and back several times). Well, the showing was undoubtedly intended to be in the parts that failed to get printed.

Min. Am I therefore as an examiner and judge expected to

conclude that Dr. De Medici *could* show the matter in question to be as he affirms it to be?

Nie. I guess it would prove out with ruler and compasses. You see it is one of the distinguishing features of Dr. De Medici's method that whatever needs proof can be adequately and exactly ascertained by the use of the ruler and compasses.

Min. Very well then. Here is a square measuring one inch on each side. Find me by rule and compasses that $\frac{1}{577}$ part of it.

Nie. A five hundredth part of an inch! I shall have to decline. I am not a skilled draughtsman.

Min. Is then Dr. De Medici's system comprehensible only by skilled draughtsmen? But I will not push you further in this line of testing his fundamental axiom. The ratio of the diameter of the circle to the circumference is another case of incommensurability as supposed by the orthodox mathematicians. Dr. De Medici says that this ratio is the fraction $3^{45}/_{289}$ or $9^{12}/_{289}$. I have looked and re-looked and looked again seeking to find how he arrives at this ratio. Can you tell me?

Nie. Surely. He finds it by the use of ruler and compasses.

Min. Do you mean to say that he has stepped his compasses along a diameter so as to mark it off just exactly into 289 parts, and then has stepped along the circumference with the same opening of the compasses so as just exactly to mark it off into 912 parts?

Nie. I suppose so. He says *it is found* to be in that ratio and that must mean of course that he has found it so.

Min. Did you ever find it so?

Nie. No, I never tried it. As I said I am not a skilled draughtsman, and I would not undertake to do so fine a job as that would be.

Min. How then can you rest assured that the ratio $9^{12}/_{289}$ is correct?

Nie. Why! Dr. De Medici lays down certain requisites that a perfect ratio must fulfil, and the ratio $9^{12}/_{289}$ perfectly conforms to those requisites.

Min. Yes, I have seen and considered those requisites and his π formula. But I find that at least one other ratio, to wit, the ratio $3^{82}/_{121}$ will just as well conform to those requisites and to that π formula as does the ratio $9^{12}/_{289}$. There cannot certainly be two different values to the ratio in question.

Nie. (Hotly). You are mistaken, you are certainly mistaken!

Min. Well then, show me how, and I will promptly confess.

Nie. I have no time now to study the matter out. What do

you say to the discovery that the sine of sixty degrees is equal to the side of a regular heptagon?

Min. I say that it is a very close approximation.

Nic. (Still excited). No approximation! De Medici's results are exact, rigorously exact. If they were only approximate his system would instantly by that same token be reduced to the level of the orthodox system and all his glory as a mathematical genius annihilated. I strongly suspect that your mind is immovably set in the orthodox prepossession.

Min. I willingly confess that my mind is so set to this extent that I shall abide by the orthodox doctrines until at least one good reason is given tending to show that De Medici is right. In law it is an approved rule that whoever would recover must recover on the strength of his own right and not on the weakness of the right of his adversary. Would you have me shift over as a mere act of election?

Nic. Not at all. But the books and papers I supplied to you demonstrate the validity of De Medici's claims.

Min. I have read them all and studied them intently and perseveringly at no small cost of brain fag, I assure you.

Nic. And what, if anything, did you find out? I have really a curiosity to learn what an orthodox bigot wants to say.

Min. I will say not what I take any pleasure in saying but the truth as I find it. I find De Medici to have been a man afflicted with over-confidence in himself. Had he had a wise respect for others he might have studied the accepted geometry and then he would some time or other have fallen to the real central idea of geometry, to wit, the aspiration to build up by the exercise of reason and upon the single fact of the interval in general a science of form. Now De Medici elaborates his entire system upon the basis and according to the suggestions of what he calls his geometry, and yet he never conceived real geometry at all. He potted endlessly and most tiresomely over linear marks upon paper and over circular marks upon paper, all the time supposing the same to be the real and ultimate things to be studied. He takes the phrase "ruler and compasses" to mean nothing but the material tools of that sort, and he naively supposes that geometrical truth can be proved by experiments with them. His results are what might be expected under such prepossessions. He is sometimes right. A man could scarcely spend a lifetime working with a good ruler and with a good pair of compasses without learning some real geometry or without confirming much more that is more or less well known. But he is mostly wrong.

He is an adept at self-deception by means of circular reasoning and by putting into his premises what he draws out in his conclusions. He projects impracticable constructions in order to make out many of his exhibits. Moreover his method is a tangle of mathematical rubbish and his style a marvel of obscurity. No one can really realize the resources of language for the concealing of thought and for the embodiment of emptiness without for a while struggling over a style like that of De Medici and trying to find out the drift and direction.

Nie. (Sarcastically). Bravely done. Not being able to prove De Medici wrong in any particular, refuge is sought in general abuse. Prove him wrong in a single particular, just one little particular. But I will not stop over you any longer. Give me back my books and papers. Now I have got them I bid you a very good day! (Exit.)