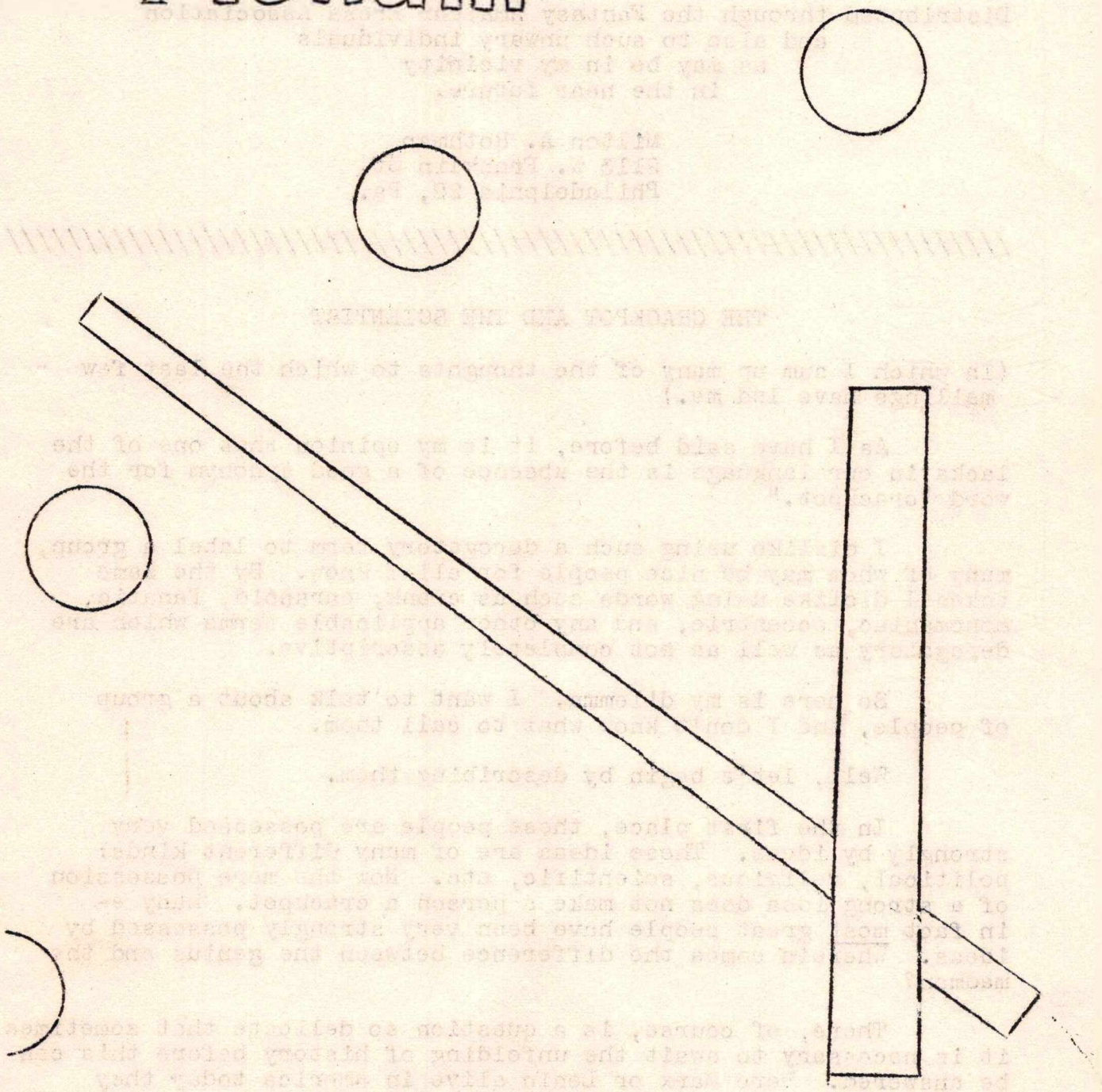
Plenum



P L E N U M

Published on this, the first day of 1948, the year of the turning.

Distributed through the Fantasy Amateur Press Association
and also to such unwary individuals
as may be in my vicinity
in the near future.

Milton A. Rothman
2113 N. Franklin St.
Philadelphia 22, Pa.

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THE CRACKPOT AND THE SCIENTIST

(In which I sum up many of the thoughts to which the last few mailings have led me.)

As I have said before, it is my opinion that one of the lacks in our language is the absence of a good synonym for the word "crackpot."

I dislike using such a derogatory term to label a group, many of whom may be nice people for all I know. By the same token I dislike using words such as crank, paranoid, fanatic, monomaniac, eccentric, and any other applicable terms which are derogatory as well as not completely descriptive.

So here is my dilemma. I want to talk about a group of people, and I don't know what to call them.

Well, let's begin by describing them.

In the first place, these people are possessed very strongly by ideas. These ideas are of many different kinds: political, religious, scientific, etc. Now the mere possession of a strong idea does not make a person a crackpot. Many -- in fact most great people have been very strongly possessed by ideas. Wherein comes the difference between the genius and the madman?

There, of course, is a question so delicate that sometimes it is necessary to await the unfolding of history before this can be answered. Were Marx or Lenin alive in America today they would be drawn wild-eyed and disheveled by the newspaper cartoonists (even as Stalin is), and yet in Russia they are national heroes.

We must not puzzle for too long over these borderline cases, but must lay down further rules for distinguishing the crank from the crowd.

Along with the idee fixe appears an inability to discriminate between truth and fiction, fact and myth, reality and ideas. (As the null-A boys put it, there is a great amount of confusion of the orders of abstraction.) This fault is great enough with ordinary people, but with fanatics it is developed to a pathological extent.

Examples of all kinds and degrees can be mentioned. Every false and misbegotten belief is due to this lack of discrimination, and contributes to the crackedness of the world.

Another discrimination ability which plays a part is the ability to distinguish between words which mean something and words which don't mean anything. You might call this "semantic discrimination," and I have discussed it somewhat in a previous Plenum. Clearly, members of the crank set lack this ability, to judge from the manner in which their pamphlets are written.

Also clearly, lack of semantic discrimination is not necessarily confined to this group which we are discussing, to judge from some of the botched up writing in the laboratory reports that some of my students submit. In this case, I think it is just lack of education.

Adding to the list of distinguishing characteristics we might mention a definitely developed paranoia. The crackpot always complains that people think he is crazy, that nobody pays any attention to his wonderful ideas, that he is being persecuted, etc. Undoubtedly, much of this is true; the distinguishing feature is that the person never realizes that all of this persecution is completely his own fault.

To sum up our list, we have:

1. The idee fixe.
2. Lack of discrimination between truth and fiction.
3. Lack of semantic discrimination.
4. Paranoia.

Other characteristics may come to mind, but I think that these are the most important ones which distinguish the group.

It is apparent that nearly everybody possesses some of these characteristics to a slight degree. Thus, the definition of the crackpot is a matter of degree -- a precise definition would have to be quantitative as well as qualitative, and in general would hinge upon the question of: How much does our subject allow his idea to rule his life?

Returning to the initial question of a label for these people, I find that my dictionary contains a convenient definition:

"Aberrant: (1) Straying from the path of righteousness; (2) Differing from the normal path, as plants or animals."

Therefore I shall hereafter use the word "aberrant" as a label for these people we are discussing. I really am not too enthusiastic about the word, but at least it has the advantage that too many semantic associations have not yet been hooked on to it.

During the past few years, the existence of this aberrant group has come forcibly to my attention, arousing my interest, and causing a great deal of thought. When I get involved with such a preoccupation, what generally happens is that I write a thesis on it and then forget it. I hope that this distinguishes me from the aberrant, who would latch on to such an idea tenaciously and try to convert everybody to it.

It might be interesting to survey briefly the extent of my experience with aberrants, so as to give an idea of just who I put into this class.

1- About a year ago I read a paper on "Orgones" by Wilhelm Reich, a "psychiatrist" who has been denounced by an article in the New Republic. This Orgone theory is a pseudo-scientific job which caused much merriment in the physics department at Penn.

2- I have read much of the literature concerning the experiments of Ehrenhaft, whose magnetic pole work was discussed for one issue in Astounding, which promptly dropped it like a hot potato. A number of people have duplicated Ehrenhaft's experiments, and the result seems to be that where he did discover curious effects, they could be explained by taking into account stray electric fields which he had ignored.

3- I have received copies of two "amateur science" magazines published in Los Angeles, and have entered into correspondence with a couple of their contributors, receiving some rather amazing letters in reply.

4- I have, of course, followed the controversy concerning Amazing Stories and Shaverism. I also read quite carefully the article by Roger Graham concerning the "frame concept" and have followed Graham's argument with Tom Gardner concerning the "ether drift" experiment.

5- I have entered into arguments with a couple of characters who had "invented" energy generating devices which closely bordered on the perpetual motion idea. One of these, intended to produce heat out of the air, actually was a perpetual motion of the second kind, which is a little more subtle than the ordinary perpetual motion. (Perpetual motion of the second kind defies the law that heat cannot go from a place of low temperature to a place of high temperature without the application of outside work.)

While this is not really much, it's quite enough to draw some conclusions, because they follow a very rigid pattern. You will notice that all of the above fall in the class of "scientific dilettantes." Fortunately, I've been able to keep away from religious and political fanatics, altho a couple of times I narrowly escaped salvation.

I don't know what to do with people who continue to believe that the earth is 6000 years old. There was one young man in the army, studying electrical engineering who kept insisting that the Bible was literally true.

People, of course, do not like to be considered aberrant. Undoubtedly a great deal of the furor in science fiction fandom caused by Amazing Stories is due to a sense of guilt. The science fiction fans are so close to being aberrant themselves, and are so sensitive to the crackpot label, that they react violently to anything which tends to push them over the line.

This is only normal. We don't like people to think that we are nutty unless we are great artists or have a million dollars. Then we can call ourselves temperamental or eccentric. Reading science fiction is a very mild form of lunacy ----- notice the enormous joy with which the fans greeted atomic energy --- This made us respectable!

Amazing Stories, on the other hand, possesses a complete lack of respectability, and so the fans have been fighting it more or less tooth and nail. The juvenile lack of literary quality was bad enough to begin with. Add to this the lack of discrimination between fact and fiction, and the appeal to anti-scientific and un-logical methods of thinking, plus the sensational method of presentation -- and we have a combination that the mature person is not going to care to be associated with.

I think it does not require too much argument to justify my assertion that the recent trend of ideas in Amazing Stories can be classified as aberrant. Every one of the four tests above is verified. There is the fixed idea -- Deros. There is, as we have mentioned, the lack of discrimination between facts and ideas. The "facts" in this case are a conglomerate and unverified collection of Fortean phenomena, and the idea is the completely ad hoc Dero philosophy concocted to explain the initially unverified "facts." (Concerning ad hoc reasoning we will have more to say.)

The semantic discrimination fault is plain to see. As one small example, we might mention the manner in which Roger Graham latched on to the phrase "ether drift", and concocted a big argument to go along with it. In this he showed his ignorance of physics, because the Michelson-Morely experiment was not intended to show a drift or flow of the ether, but was intended to detect a motion of the earth through the ether ---- a matter which is very much different.

The paranoid tendency is clearly shown by letters written to the fanzines by Richard Shaver and Roger Graham.

However, it is not my purpose here to speak exclusively of Amazing Stories and its idiosyncracies. My purpose, if any, is a more general one -- to discuss the reasoning (or unreasoning) methods of the scientific dilettantes and to look for methods of keeping out of the logical pitfalls to which such dilettantes are especially susceptible.

There is a bit of self-defense in all of this. As I am currently spending a rather prodigious amount of effort in pounding into my head the large body of knowledge which has been built up by physicists during the past few hundred years, I naturally resent it like hell when somebody comes along and says, in effect: "These guys are all wrong, and my idea is all right."

Of course, the first thing I do is to look at what this person has to say, because he just possibly might be right, and it would be awfully embarrassing for me to be on the wrong side of the argument. There really isn't much danger, though.

For scientists really are pretty smart people, you know, in spite of all popular opinion concerning the sense or lack of sense of scientists. I can't vouch personally for any other groups, but I'll take the group of graduate students at Penn and stack them up against any other group you show me for brains and character. Nor are they a dreamy bunch of intellectuals. Most of them were in the armed services, and a goodly portion of them were officers.

By all this I mean that you must be quite on the ball to get anything past these people, and any ideas which you may have for revolutionizing science must be really good if they are going to be accepted.

Things now are not liked they used to be -- even as recently as fifty years ago. At that time even a good idea had rough sledding to become accepted, and it was then that the idea arose that scientists were old fogeys who wouldn't recognize a new theory if it kicked them in the face. But things are now different. In the first place there have been so many scientific revolutions during the past fifty years that a scientist has to be very sure of himself to discredit a new idea.

Not only that, but the fundamentals of scientific logic have within the past few decades been put on a clearer basis than they were previously, and we are better equipped to estimate the worth of a new idea.

As it has been since the time of Galileo, the first criterion of a physical theory is the experimental evidence. While it is easy to concoct self-consistent systems of physical laws

by sheer mental powers, this system remains in the realm of pure mathematics, and does not become physics until we relate it to the natural universe by observing whether or not these laws predict results which we can verify by experiments.

All the time we must keep refining our experiments and extending them to new circumstances so as to make sure that our laws hold for all cases. It was by this method of refinement that the simple Newtonian and Euclidean universe became an Einsteinian and non-Euclidean one.

Physicists now hold a picture of the universe which has been built up by a slow accretion of ideas and concepts. They do not claim that this picture is the last word, but they expect that knowledge will keep piling up until another Newton or Einstein is enabled to set forth a new first principle which will reduce our present unwieldy picture to a simplified or more useful form.

Now suppose a person comes along, performs one experiment, and tells us that our old ideas are all wrong, and that his explanation of things is the correct one.

This is a very serious matter, and the scientists must be excused if they do not raise this newcomer to their shoulders and shout hosannas. Instead, it is their habit to scrutinize this new statement minutely, attempt to pick holes in it, and in general give it a trial by fire. If our dilettante now complains that his idea is not given a chance, that he is being persecuted, etc., that is fair evidence of a paranoid state. If he really has the right stuff in him, he will pick himself off the mat and go in with fists swinging, and in the end his new idea will be accepted. ..... It's been done.

To present a concrete example of this situation, I would like to go back to our friend Roger Graham and his ether drift experiment. (It seems that this paper is turning into a critique of Mr. Graham. Maybe that's what my subconscious wanted me to do all the time.)

If you will recall, his argument went something like this: Michelson and the rest of the boys had failed to discover a drift of the ether with respect to the earth, but this was because they had been looking in the wrong direction. Graham then set out to show that the ether was actually drifting in towards the center of the earth. He set up two transit instruments, each looking at the reflection of the other in a mirror which was located horizontally on the floor. Under ordinary laws of reflection, if you looked thru transit B and lined up the image of transit A with a scratch mark on the mirror, then if you looked through transit A you should find B also lined up with the mark.

However, Graham claimed that there was a displacement of the image, and from that concluded that there was a vertical ether drift.

We now proceed to examine this through several stages:

1- First we examine the experimental setup and determine possible causes of error. The importance of this is not always realized. Tom Gardner has already questioned the position of the scratch on the mirror -- whether it was on the top or bottom of the mirror. Graham claims that the scratch was on the same plane as the reflecting surface.

The next point which comes to my mind is to question the accuracy of the instruments used -- namely, the transit instruments.

Now a transit instrument is nothing more than a telescope containing a cross-hair and mounted on a pivot calibrated in degrees of arc. Telescopes which contain cross-hairs are subject to a disease known as "parallax." This is caused by the fact that the reticle containing the cross-hair is not exactly in the focal plane of the eyepiece, so that the crosshairs appear to move back and forth across the field of view as the eye is moved back and forth in front of the eyepiece. A good reticle should appear fixedly superimposed upon the image being observed. This could possibly account for the discrepancy observed by Mr. Graham.

Or more simply, the cross-hair might not have been exactly centered in the reticle of the particular instrument used. This would also introduce an error.

With such possible sources of error, a person must be excused for not immediately accepting Graham's results as correct. However, Graham rightly invites all and sundry to try the experiment themselves. I make several interpretations of this invitation:

a- Graham actually believes the effect to be real.
b- He thinks that everybody is so lazy that nobody will really try the thing.
c- The thing is a gag and he doesn't care what people find.

2- The next step. Suppose we assume for the sake of argument that the experimental technique is good as gold, and that this mysterious effect actually takes place. Now this is very interesting, and we must find an explanation for this which fits in with our previous picture of the universe, or else we must find a new picture of the universe.

Graham's explanation is simply that Einstein was wrong, and that an ether drift exists towards the center of the earth. No more and no less.

Here we come to the main reason for using this as an example of dilettante logic. For we find here a fallacy which is simple and common: to observe one phenomenon, and to apply to it

an explanation which, while a sufficient one, is not a necessary one. All we have to ask ourselves is this question: "Is this the only possible explanation for this phenomenon?" It may be the only explanation we can think of offhand, but this does not make it the only possible one.

The idea of "necessary and sufficient" reasons for a thing is a most useful one to keep in mind as a general principle. These words are used continually in mathematics, for when a theorem is proven, there must be specified the necessary and sufficient conditions under which the theorem is true.

Likewise, in physics when a sufficient explanation is advanced for a phenomenon, we must also ask ourselves whether it is a necessary one.

Sometimes the answer is not an easy one. As a well-known example, we can cite the case of the shift towards the red of lines in the spectra of distant galaxies. A completely sufficient explanation is the idea of the expanding universe. However, this is not a necessary explanation, since others have also been advanced.

All this is very closely connected with the business of ad hoc hypotheses. The Graham ether drift theory is a perfect example of this. An ad hoc hypothesis is, simply, a theory devised to explain one or more observed facts. As we have seen, we can never be quite sure that such a hypothesis is necessary as well as sufficient. We may have an explanation which perfectly well fits the few facts that have been observed, but how do we know it is the correct explanation?

Oftentimes, ad hoc hypotheses are tentatively accepted by scientists in lieu of something better. The Lorentz-Fitzgerald contraction was actually such a hypothesis, advanced simply to explain the results, or lack of results, of the Michelson-Morely experiment.

How, then, can we make a hypothesis become respectable, so that it can drop the ad hoc label? There are at least three ways of doing this:

a- We can use the hypothesis to predict events which are later observed.

b- We can show how the hypothesis can be deduced from the fundamental postulates upon which our science is based.

c- We can develope a new set of basic postulates -- that is, a new system of nature -- in which our newly observed fact fits, and from these new postulates predict still newer phenomena, which may then be observed.

In the case of relativity, the third method was used: the impossibility of detecting motion relative to the ether was assumed as a postulate, and a consistent system of physics built upon it. If, now, Mr. Graham wishes to alter this postulate by dragging in the presence of a ether drift towards the center of the earth, it also becomes his responsibility to explain away the presence of all the phenomena which were predicted by the postulate which he is now removing -- the precession of the orbit of Mercury, the mass increase of rapidly moving bodies, etc.

Furthermore, we should be able to predict from Mr. Graham's perpendicular ether drift certain other consequences which could be tested.

The first thing we do is to make some calculations. This is a big pitfall for the dilettante. Not being too conversant with mathematics, his habit is to make general statements which sound peachy, but which break down under the weight of the slide rule.

Not knowing the details of Mr. Graham's experimental setup, I can make no exact calculations, but will remark that to deflect a beam of light one centimeter in a distance of 3 meters, the ether must be moving at a rate of 1,000 kilometers per second. This is considerable. Surely this kind of motion must have other effects, and I predict that this would cause aberrations in the positions of stars as they move from horizon to zenith. An astronomer could easily calculate such discrepancies and could look for them. Obviously, aberrations of this magnitude would have been noticed without the need for looking.

Another matter to be considered is this: Does our new hypothesis make nature more simple or more complicated? While there is no a priori objection to a complicated theory, sometimes we come to a point where a theory, in explaining one fact, must drag in other ideas which are even harder to swallow than the thing we started with.

As a matter of fact, the very idea of an "ether" is such a theory. At the end of the 19th century, when men had calculated what properties an ether must have in order to transmit light with such a velocity, and in order to transmit transverse vibrations while excluding longitudinal vibrations -- they found themselves in the predicament of being required to believe in an ether with the most preposterous properties, an ether which was indetectable, perfectly frictionless, attenuated, and yet with enormous rigidity to sustain the vibrations applied to it. Furthermore, Maxwell had shown how by using the idea of electromagnetic vibrations, it was not even necessary to use the concept of an ether.

So you see that instead of beating our brains out over something which is indetectable and which isn't even necessary, it is much simpler to ignore the whole thing entirely.

To understand fully why the concept of the ether was discarded it is necessary to go through a complete study of the history of physics during the past hundred years. While this would make a very interesting book, I fear that it would be impractical to attempt the task at this moment.

And so we see the final fault in Roger Graham's Theory of Perpendicular Ether Drift. Far from being a new idea, it is a resurrection of concepts which have been discarded by physicists many years already. It puts Roger Graham in the position of one who makes a big commotion by saying that you can improve the Model T Ford by installing front-wheel drive --- when nobody uses Model T Fords anymore.

I use this again as a particular example of a general habit among the scientific dilettantes. They claim that their ideas are new and revolutionary, completely unconscious of the fact that in reality they are only rehashing ideas which were long ago discarded and passed over by the scientists.

The 18th and 19th centuries were periods of theories in physics concerning "fluids" which were invoked to explain all phenomena. Heat was a fluid, electricity was two different kinds of fluids, the ether was a fluid. There were also vortexes. If you look at the writings of the aberrants today you find the same things repeated as if they were new and brilliant ideas.

This is not too unexpected, since the fluid theories were easy to grasp, and at least qualitatively explained most of the phenomena which were observed in nature. It is only when you become rather sophisticated in your inquiries that you meet discrepancies which cause the fluid theories to break down. Our scientific dilettantes, then, are people whose scientific development has remained stationary at approximately 1890, and who cannot understand that the fundamentals of science constitute a dynamic system which consistently changes as we obtain more understanding of nature.

Even among scientists it is the tendency to become fixed mentally at a certain point. However, it has become more and more widely recognized that the theories of science do not remain static. We have seen how the theories of a mechanical ether gave way to the idea of an electromagnetic field, which now is being enveloped in general relativity, which in turn is bound to become part of some more general theory that will perhaps give us some better idea of just what an electric field is.

To sum up, we have seen how some of the characteristics of aberrants may be recognized, and we have taken a light glance at their methods of thinking. We have seen how the chief occupation of the scientific dilettante is to present hypotheses which, while perhaps even plausible, are not necessarily true.

The very heart of the philosophy followed by these people is admirably summed up by the quotation from Amazing Stories which Joe Kennedy was good enough to repeat for us in the last mailing. This quotation went as follows:

"A wise man believes anything until it is disproved. Only a fool refuses to accept anything until it is demonstrated."

The utter absurdity of such a statement is easily brought out by a reductio ad absurdum.

For according to this principle I might say that in the absence of evidence to the contrary I believe that there are elephants on Mars with purple tusks. The next person coming along could say that the elephants on Mars have green tusks. According to the above principle it would be necessary for me to accept both of these contradictory theories as being true.

The fundamental fallacy beneath this principle is the general fallacy of two-valued logic. According to this I must either believe in a theory or not-believe in a theory.

As soon as we introduce multi-valued logic the matter is clarified, and I don't have to either believe or not-believe. I may simply suspend judgement until sufficient evidence is introduced into the case. This is the method of the agnostic.

The fact which the members of the aberrant group fail to realize is that a scientist must be agnostic in every matter pertaining to his profession. The only manner in which the scientist can untangle true theories from false theories is to determine whether or not the theory describes nature as it actually is.

As for the layman, he sometimes has difficulty in deciding who is handing out the better line -- the scientist or the pseudo-scientist. It should be more or less plain that Amazing Stories is not to be considered a suitable textbook in theoretical physics, mathematics, or natural history.

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For those interested in the thought processes underlying scientific logic, I recommend "The Foundations of Science" by Henri Poincare. The author is recognized as one of the great mathematicians of all time, and the book is a solid piece of work. It is one of the prime sources for the ideas of Korzybski, but compared with the turgidity of "Science of Sanity" the writing of Poincare is a marvel of clarity and precision. Unfortunately, much of it is based upon a certain knowledge of physics and mathematics, and I fear that the lay reader would find it very tough going.

In which we talk about the previous mailing, for a change:

FANTASY AMATEUR: The quietly competent atmosphere about this organ fits in well with the surprisingly good quality of this quickie mailing. I think it bodes well for the future of the FAPA.

GRULZAK: For a change, and a pleasant one, Joe Kennedy shows signs of something more substantial than surface cleverness and a fine mimeographing technique. Particularly I like the quotes from Amazing and "The Natural History of Nonsense," which are beautifully apposed. Of this I have already spoken, a page or two ago.

HALF LENGTH ARTICLES and REQUIEM. We take these together for obvious reasons. Burbee's account of the evening with the Perdues is quite amusing. However, the screams of protest from Betty bring one back to the realization that these are people about whom we are talking, and we think that maybe a little more discretion and a little less candor could have been applied.

I think the answer is that in our society if you act without dignity you must expect to be treated without dignity. You can't act like a clown and expect to be treated like a king.

It so happens that the antics of the Perdues came damn near wrecking the FAPA, an organization that we like. While the FAPA may not seem like an important thing to Betty Perdue, nevertheless it has a certain amount of importance to us, and publication of the Halflength Article is our way of expressing annoyance at the manner in which the Perdues have handled our organization.

If Elmer had had any sense he would have resigned from the editorship as soon as he god married. Then all of this would have been avoided.

FRAPPE: This should make one of the nicer items of the FAPA from now on.

Regarding my remarks of "sophomoric asceticism," perhaps I should rip the mask from my leering face, and confess that my editorial in the Spring mailing was at least half way a gag. (You will recall that I was giving the younger fans hell for bad fanzines, and ended up denouncing the world at large, a la Philip Wylie.)

My intentions were fundamentally to stir up a bit of excitement in the FAPA at a time when things were becoming dull. Intoxicated with the sound of my own rhetoric, I went on and on, at absurd length. The payoff is that lots of people agreed with me, and I didn't get any arguments at all.

What I really meant by the last line, when I challenged people to prove me wrong, was that I wanted the younger fans to show me up

by actually producing some work of merit. So far, the only one to show any signs of doing this has been Joe Kennedy.

PHANTEUR: Welcome back.

The article concerning Negroes and science fiction merely points out the conventions in all of what we might call "polite" literature. If Negroes do not appear as heroes or even as supporting characters in science fiction, it is because the same is true in general literature. (With the exception of novels concerning race problems.) In pulp fiction the conventions are quite rigidly drawn: the hero's name is anglo-saxon, as is the heroine's. The Villain is allowed a foreign name, type depending upon who happens to be our enemies at the moment. And so on. The idea of including a Negro as a story-element just completely upsets all stock notions of plot construction.

As a matter of fact, I believe that there was one important story in the Gernsback Wonder Stories in which the entire human race became black some time in the future. Was it "The Man Who Awoke?"

And leave us not forget Dr. Worthington in "The Devil Makes the Law," by Robert Heinlein in Unknown.

From November, 1947, PHYSICS ABSTRACTS:

"The number of galaxies per unit volume. Fletcher, A. ..... Correction of an error of statistical technique overlooked by previous authors leads to a doubling of current estimates of the space density of galaxies."

Things are crowded all over.

HAPPY GHU YEAR