Correspondence.

Some Myths Exploded.

To the Editor of the SCIENTIFIC AMERICAN:

In your issue of September 26, page 203, one of your contributors says:

"That the sun and planets revolved round the earth was once a common belief. Giordano Bruno knew otherwise, and for so saying was (about 1600) burned at the stake. . . . To day his theory is an accepted fact."

There are at least two misstatements here:

1. Bruno was not put to death for saying that the earth revolves around the sun, nor was anyone else ever put to death for saying so.

2. It was not "his" theory, unless in the sense that it is the theory of every schoolboy who hears it and accepts it. It was the theory of Pythagoras. It may be called the theory of Nicolas de Cusa, since he revived it; he was born in 1401, and was made Cardinal by Pope Eugenius IV. in 1448. It was the theory of Copernicus; from him it gets its name. He put more clearly than anyone who ever lived before him, all the arguments that could then be given in its favor, and made the theory appear more probable than ever before. He was born in 1473. A disciple of his, Widmanstadt, expounded his theory before Pope Clement VII. in 1533. Copernicus dedicated his great work on the revolutions of the heavenly orbs to the reigning Pope, Paul III., in 1543, five years before Bruno was born.

Bruno discovered no new arguments in support of the Copernican theory, and he was incapable of putting the old ones more clearly than others. He may be called a rhetorician, but hardly a scientist. The chief characteristic of his writings is fog.

Barbieri ("Neapolitan Mathematicians and Philosophers," page 119) says: "His powerful imagination veiled his intelligence, and he reasoned like a person in hysterics."

Bailey ("History of Modern Astronomy," vol. v., page 531, Parma, 1794) says: "Bruno knew only enough astronomy to explain the sphere."

Poughkeepsie, N. Y. J. F. SHEAHAN.

To the Editor of the SCIENTIFIC AMERICAN:

Will you please allow me to object against an unscientific remark made in the SCIENTIFIC AMERICAN of September 26, page 203, in the article entitled "A Few Suggestions for Inventors of Safety Devices," by Edwin Phillips. The remark reads as follows: "That the sun and planets revolved round the earth was once a common belief. Giordano Bruno knew otherwise, *and for saying so* was (about 1600) burned at the stake and his ashes cast to the winds." The first sentence is historically correct; the second historically incorrect, and consequently unscientific.

In your own Encyclopedia Americana, art. "Bruno Giordano," you have the words: "After an imprisonment of two years [ought to be six years], that he might have opportunity to retract his doctrines, he was burned for *apostasy*, *heresy*, and *violation of his monastic vows*." The only other remark made in the Americana in the same article on the system of Copernicus says: "But his inference that the world is infinite and immeasurable and his doctrine of the plurality of worlds at the moment when the new system of Copernicus was attacked from all quarters, could not but be looked upon as a crime."

In the Catholic Encyclopedia, William Turner, B.A., S.T.D., Professor of Logic and of the History of Philosophy at the Catholic University of America, Washington, D. C., in the article "Bruno, Giordano," positively asserts: "Bruno was not condemned for his defense of the Copernican system of astronomy, nor for his doctrine of the plurality of inhabited worlds, but for his theological errors, among which were the following: That Christ was not God, but merely an unusually skillful magician, that the Holy Ghost is the soul of the world, that the devil will be saved," etc.

The Kirchenlexicon, Herder, Freiburg vol. II, page 1,369, art. "Bruno, Giordano," goes still farther and gives the twelve indictments lodged against Bruno, January 14, 1599, by the Roman Congregation. The indictments as given condensed by Schoppius read as follows:

"1, There are innumerable worlds; 2, the soul migrates from body to body, in fact also some to other worlds, and one soul can inform two bodies; 3, magic (witchcraft) is a good thing and licit; 4, the Holy Ghost is the soul of the world; 5, and this is what Moses meant to say when he writes: 'The spirit of God hovered over the waters'; 6, the world is eternal; 7, Moses worked his miracles by witchcraft; 8, Moses invented his laws; 9, the Scriptures are the property of everybody; 10, the Jews alone derive their origin from Adam and Eve, the rest of mankind from two others, whom God created the day before; 11, the devil will be saved; 12, Christ is not God but a skillful magician."

I fail to see where Mr. Phillips got his information, and consequently cannot allow his remark to go unchallenged. Rev. VICTOR STEPKA.

St. Paul, Mo., September 28, 1908.

[The above correspondents are correct in their criticism. The principal charge against Bruno was that he had broken his monastic vows and taught a pantheistic doctrine.—ED.]

THE PAPER INDUSTRY AS RELATED TO FORESTS AND EDUCATION.

The great German chemist, Liebig, once said that the degree of a nation's civilization might be gaged by the amount of soap which that nation consumed. A similar epigram would truthfully hold good for paper consumption. The amount of paper used is a very good indicator of the educational development of a nation. The diffusion of newspapers, magazines, and books is one of the principal means for the dissemination of learning. For the purposes of comparison we have assumed that all news paper, book paper, writing paper, etc., has been run from the machines in a continuous web of paper adapted for a newspaper press of heroic size.

In the case of the United States this annual shaft of paper would be 830 feet high, 377 feet in diameter, and it would weigh 2,730,000 tons of 2,000 pounds. Germany, a great book and reading nation, comes next with a 937,000-ton roll 588 feet high and 267 feet in diameter. England follows with a roll 495 feet high, 225 feet in diameter, and weighing 573,000 tons, certainly a considerable quantity for an insular kingdom. France comes next with a 419,000-ton roll 445 feet high, 202 feet in diameter. Austria makes a good showing with her 346,000 tons, the roll being 418 feet high and 190 feet in diameter. Last of all the six great paper-producing countries stands Italy, whose annual production of paper amounts to 265,000 tons, the roll being 379 feet high and 172 feet in diameter. The aggregate amount of capital invested in all six countries is little short of a billion dollars. The analysis of materials and product is always interesting. In 1905 the raw materials consumed in this industry in the United States were as follows:

	Cords.	Value.
Pulp wood	3,050,717	$20,800,871
	Tons.	
Rags	294,552	8,864,607
Old or waste paper	588,543	7,430,335
Manila stock	107,029	2,502,332
Straw	304,585	1,502,886
Sulphur	130,400	3,221,834
Other chemicals	.....	5,111,546
Pyrites	2,036	31,925
Clay	201,218	2,096,570
Sizing	52,171	1,838,035
Fuel	.....	13,178,567
Mill supplies	.....	2,526,950
All other materials	.....	11,034,537

Adding other elements of expense we have a grand total of $111,251,478.

This large expense bill is offset by a valuable product which may be classified as follows:

	Tons.	Value.
News in rolls	840,802	$32,763,308
News in sheets	72,020	3,143,152
Book paper	434,500	31,156,728
Cover paper	22,150	2,023,986
Plate, litho, etc	19,837	1,458,343
Cardboard, tickets, etc	39,060	2,764,444
Writing paper	131,934	19,321,045
Miscellaneous fine paper	14,898	2,928,125
Wrapping paper	644,291	30,435,592
Tissue paper	43,925	5,056,438
Blotting paper	8,702	1,046,790

Other forms of paper, such as boards, building paper, hanging paper, etc., bring up the total in round numbers to 2,730,000 tons. This figure, which is derived from statistics compiled exclusively for the SCIENTIFIC AMERICAN, differs somewhat from the census figures of 1905. The total value of the products of all kinds in 1905 was $188,715,189; the total expenses were $165,807,763, leaving a profit of $22,907,426, or 8 1/3 per cent on the investment. This is certainly a small enough return on the capital invested.

We now come to another interesting phase of the subject, that is the destruction of the forests. We hear a great deal about our forests being rudely grabbed by the insatiable pulp maker. Now, as a matter of fact, less than 3 per cent of the timber cut ever enters the pulp mill. This figure is more than conservative, and is vouched for by expert foresters. The possibility of a dearth of wood has caused some of the largest and most conservative mills to lay aside large tracts of land for reforestation and for every cord of wood consumed now a forestry charge is sometimes added, as follows, to pay for growing and protecting timber for later consumption:

Year.	Cost per Cord.	Forestry Charges.	Total.
1900	$4.92	..	$4.92
1901	5.04	..	5.04
1902	4.83	$0.55	5.38
1903	$5.42	$0.55	$5.97
1904	5.93	.55	6.48
1905	6.10	.55	6.65
1906	5.95	.55	6.50
1907	6.39	.55	6.94

The whole question is admirably summed up in a letter, from which we quote the substance, to an official in the Forest Service, United States Department of Agriculture. This letter was written by the general manager of a group of mills. He says:

"We own one tract of land containing about 300,000 cords of growing wood, which cost us about $225,000; we have taken practically no wood from this tract; the annual interest charges amount in round numbers to $11,000, and to this amount must be added taxes, expenses of the Forestry Department for work spent on the tract, cost of keeping out fires, etc. All these expenses are charged to the tract at the end of the year, but if no wood is cut from the tract no charge can be made against manufacturing. The longer we hold the tract the greater the cost per cord, unless the growth is sufficient to take care of the carrying and Forestry Department charges, which accumulate at a very rapid rate; therefore, inasmuch as we have many tracts containing large amounts of growing wood from which we are cutting very little wood at this time, the ultimate charge against manufacturing will be heavy. It is almost impossible to estimate what this charge will amount to until we have had years of experience, and can compute our costs on the same basis that enables the life insurance companies to fix their premiums on policies. The same principle is involved. If we were not looking ahead to protect our mills, we could temporarily realize considerable profit by skinning our land, as is done in the lumber and other industries, but the situation with us is quite different from what it is with them. We have millions of dollars invested in works and machinery, and unless we conserve our wood supply our investment in plant is worth only what it will sell for as scrap. On the other hand, a lumberman owning a $1,000,000 lumber tract can cut all the wood off in a $20,000 sawmill, and when he has skinned his land he can either move his sawmill to another location or abandon it; his mill investment is small, and his loss amounts to little. You will, therefore, appreciate the fact that we must preserve our wood supply, and we are willing to go to any practical extent to create a perpetual supply of wood for our mills. This is the policy we have followed for some time past, and we shall continue to follow it so long as we can afford to do so.

"I have endeavored to bring the above facts before the Pulp and Paper Investigation Committee at Washington. There is no tariff on pulp wood from Canada, but there is a tariff on pulp and paper. Now, if this tariff on pulp and paper should be taken off, it would bring us into competition with Canadian and foreign mills where wood, or labor and other materials, can be secured at low prices, especially in Canada, where there is such an abundant wood supply as to make reforestry unnecessary for many years to come. This would result in forcing prices to a point where there would be but one course open to us, namely, to realize on our wood by skinning our land and then go out of business. I claim that any industry which must subsist on wood and which is reproducing the wood it consumes, thereby not reducing the forest area but maintaining it, should be encouraged and protected."

This certainly shows a very sane realization of the duties of society in conserving our natural resources. Nearly all mills owning large tracts of land have expert foresters who determine what timber shall be cut. The timber reservations are in constant danger from fire. At the time of writing, on one forest for eventual paper pulp consumption 300 men are employed in fighting fires and making timber-denuded zones to arrest the progress of the elements.

Drought is also a foe to the paper maker, as an abundance of water is required to wash the pulp. One mill with fourteen large paper machines is running with only two machines at the present time. The continued droughts of September have resulted in a serious curtailment of production. This taken in connection with labor difficulties has resulted in an extraordinary condition which is that the visible supply of paper for the newspapers of the country is only sufficient to last thirty days. Paper is being consumed for this purpose at the rate of 2,400 tons a day and the outlook is far from promising.

The paper industry is very interesting in all its phases and we have attempted to draw the attention of the reader to some peculiar facts concerning the same.

Engineering News describes a two-stage vacuum pump, capable of producing a vacuum within 0.02 inch of the barometric height, which is being used by makers of incandescent lamps. The pump is of the reciprocating piston and cylinder type with two cylinders of 12-inch diameter and 12-inch stroke. The valves are operated mechanically from eccentrics on the main shaft. The machine may be driven by belt or gearing, or is built with steam cylinders attached.