BARTOLOMEO BIZIO'S LETTER TO THE MOST EMINENT PRIEST, ANGELO BELLANI, CONCERNING THE PHENOMENON OF THE RED-COLORED POLENTA*[a]

[TRANSLATED FROM THE ITALIAN]

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Received for publication May 10, 1924

Three years have already elapsed since the strange reddening of "polenta" (corn meal mush) created such a stir. And as I have ever since been reminded of it by the return of summer, I feel that I should give exact information regarding all the circumstances which accompany that phenomenon and of the special characteristics of this new organism, adding thereto a brief review of the fortunes of those things that I, before any other, made public concerning this subject.

In order not to omit anything strictly pertinent to the topic, I deem it necessary to tell you the date of what may be considered to be the first appearance of the phenomenon. Without a doubt it was first observed in the early part of July, 1819, although I am of the opinion that it has manifested itself at other times in the warm season whenever circumstances conducive to its production have combined. Nor do we need the testimony of peasants to prove this, as Melo[1] thinks. Indeed such testimony would lead us to think the contrary. Why then did they marvel and create such an excitement when they saw on the aforementioned date the surface of the polenta take on a brilliant red color? If, according to Melo, they knew that such a reddening takes place in warm, rainy seasons, it follows that it would have been

* Letters are used to designate translator's notes placed at the end of the article. Figures are used for the footnotes that appear in the original.

[1] See Giornale dell'italiana letteratura del Da Rio, tom. 49, pag. 333.

so well known that the people could have had ample time to study the conditions which lead to its production—which study was not made.

I say, nevertheless, that the phenomenon must have appeared at other times, but I conclude this from the results of the experiments which indicated the circumstances necessary for its appearance. And if you ask me why the peasants noticed the phenomenon only at the aforementioned time, I shall reply that conditions at that time were such that the effect was very noticeable.[2] In this case, the whole surface of the polenta took on a bright red color; whereas in other cases only small colored spots appeared, unobserved by the ignorant peasants. This, then, I consider to be the reason why the appearance of the phenomenon did not cause a commotion until 1819. Nor will I ever accept the explanation of Melo, who ascribes the production of the phenomenon to the great corn crop of that year. True, the harvest was unusually great that year, but it is none the less true that there was an equal abundance in other years without the production of the phenomenon to such a degree as that of 1819. Furthermore, I have constantly observed that, in addition to a warm and damp atmosphere, the phenomenon is never developed so fully as in 1819, unless the polenta be placed in foul air.

Still insisting that the rich crops were the cause of the phenomenon, Melo assures us that in that year the farmers made such lavish use of the polenta that they always had a surplus, even two or three days after having made it. In calling our attention to this, Melo would have us believe that such a long period is necessary for the formation of the phenomenon. This is not true, since the red color appears within twenty-four to thirty hours, if the atmosphere is damp enough. Indeed, later than this time other types of molds appear which effectively impede the red coloring. This agrees with what is generally

[2] It is a fact that in 1819 the temperature rose higher than it had for several years. This condition no doubt favors a greater evaporation which makes a greater humidity. It would be tedious to discuss all of the effects which may be produced in the atmosphere by an unusually warm summer.

the case; that is, that larger plants so weaken the smaller ones that these latter, sapped in their strength, finally die.

I consider it well to inform you of Melo's error with regard to the time necessary for the production of the phenomenon so that you may see clearly that under favorable conditions it can be produced without a rich harvest, since in many cases it does not require even 24 hours before the polenta becomes tinged with red, as I shall explain further.

It would therefore be of no avail to discuss the date of the first appearance of the phenomenon, for the causes that produce it and the substance on which it manifests itself show conclusively that the phenomenon must have had its origin at the time when corn meal (maize) or the flour of other cereal grains came to be used as food.

Instead, then, of engaging in further research on this point, it is better to state again that the single year 1819 may be considered as the first in which this red growth was observed; and it is better to emphasize it so that Melo may not lead us in error by referring to an observation of the phenomenon some years previous. The clearest proof to convince him of his mistake is to remind him of the stupor and marvel, and even fear, of the peasants who considered the coloring of diabolical origin, calling the phenomenon the "bloody polenta." Indeed their fear was so great that they would not live under the same roof where such supernatural influences were operating. They turned thence to the priests imploring them to banish such maleficent spirits. It even happened that Abbé Melo himself was asked to go to the house of a certain Borgato,[3] a farmer in the district of Padua, to free it from evil spirits. This, of course, is the natural philosophy of the people; that is, to ascribe to supernatural causes all those things of whose origin they are ignorant. And since ignorance not infrequently is the cause of calumny, the families in whose homes the phenomenon occurred, were charged with all sorts of evil doings. To this, then, must be attributed the reason for the commotion caused by the appear-

[3] See Da Rio, op. cit., t.c., pag. c.

ance of the phenomenon; an excitement which reached such proportions as to demand the intercession of the Police Department, who appointed a Commission, composed mainly of professors of the University of Padua, to investigate the phenomenon. This was peculiarly fitting, inasmuch as the greatest stir arose in Paduan territory, and particularly in the town of Legnaro, at the house of a certain Antonio Pittarello.

Several days, however, passed without any information on the origin of the phenomenon before I sent a paper on the subject to the Governmental Authorities, explaining therein that the coloring of the polenta was but a natural effect. That same day, August 22, I informed several educated persons of this city of the results obtained from my experiments. Among these persons, were Professor Innocente, who desired to have some of my colored polenta, and Dr. Dal Negro, a brother of the eminent professor in the University of Padua, and member of the Commission appointed to study the phenomenon. Due to this, the results were divulged rapidly, although I did not publish them in the Official Gazette until the 24th of the same month.

For several days succeeding its publication, there was much discussion of my experiments in the columns of this newspaper; and to make them still more well known, an enterprising publisher printed them in a small pamphlet, which he sold in the streets, so that the general public as well as educated persons came to know about them.

But leaving aside this general discussion, I shall expound that which is strictly pertinent to science; and not wishing to omit anything which may serve to elucidate the causes of the phenomenon, I shall describe only the two most important experiments published in the Gazette.[b]

Experiment 1.[4] At 2:30 in the afternoon of August 20, that is, an hour and a half after I observed the phenomenon, I placed some ordinary polenta under a glass globe placed upside down on a plate containing

[4] The report of these experiments was published in the Gazzetta privilegiata, anno 1819, no. 190, martedi, 24 agosto.

water in such a way, however, that the polenta was more than an inch away from the water. At 11:00 in the morning of the following day, there appeared on the surface of the polenta some red spots, which multiplied so rapidly that the whole surface was colored by the evening of the same day—less than forty-eight hours from the time the experiment was begun.

I saw that as the reddening was taking place, it was well to remove the water and to renew the air within the globe. The temperature of the air was then about 21° Reaumur.

Experiment 2. I suspended some polenta in a place where the atmosphere was damp and continually changing, and where, in addition, foul exhalations were being emitted. Observing that the polenta was becoming dry, I moistened it with water a few hours after I began the experiment. In this case, the phenomenon made its appearance sooner than in the preceding experiment, and the red color was of the brightest hue imaginable.

These two experiments prove, as you will see, that this reddish matter of the polenta is produced in a very damp and warm atmosphere. If in addition to this, there are putrid exhalations in the air, then it is still more conducive to the production of the phenomenon.

These were my first deductions; but thinking since of a circumstance, to which Professor Innocente turned his attention, I suspected that the fact that I had already had some colored polenta in my hands and had kept some in my own house might have contributed to the formation of the red color on the polenta used in the experiments. In fact, if the colored matter that was produced had been a moldiness, we know with what fecundity these very minute plants are endowed, and how fine their seeds are, so that they could easily be borne anywhere.

This, then, being possible, I could no longer place any confidence in my experiments, and I became uncertain as to the production of the phenomenon by a warm, damp and foul atmosphere. The greatest obstacle presented by this new difficulty was that I could not clarify the matter by myself. But since necessity is the mother of invention, I wrote to Agostino Mano-

cchi of Mestre, a young man of distinguished talents, requesting him to repeat my experiments. He kindly consented to do so, and obtained very favorable results, whereby all doubts were then dissipated. Nevertheless, although the whole matter was made clear enough, I wished to repeat the experiments myself while I was in Padua in 1820. Again this time the phenomenon appeared as in the preceding year, although I had not had any colored polenta in my hands before the experiment. I did the same at Vicenza, and in various other places in the territory, and since then I have repeated the experiments at Venice. In all these cases, I obtained like results with a combination of the same circumstances. I must however, confess that in repeating Experiment I in 1820, 1821 and 1823, I did not get so much red matter on the surface of the polenta as I did in 1819. But this richness of color and of matter resulted when the experiments were performed in places near rice fields. Indeed, I observed that the coloring appeared sooner on the days when water was drawn from the rice fields, which fact strengthened my opinion of the influence of foul exhalations in the production of the phenomenon.

In this connection let me point out that Melo in his published articles makes mention only of humidity, omitting to say anything about foul air. He neglected to copy this latter truth (the influence of foul air) from me, but he was kind enough to indicate one of my mistakes,[5] expatiating at length on it instead of dismissing it with the severity which it deserved. And strictly speaking, I do not consider it to have been an error, having expressed myself thus: "It is a constant characteristic of polenta made with meal made from *Zea mays*, or Indian corn, to produce the coloring matter on its surface, whenever it is placed in a damp atmosphere, or subjected to foul exhaustions, perhaps because under such conditions, the polenta gives rise to spontaneous putrefactions." I would ask you to pay particular attention to the word "perhaps," and to read what I have written at the end of my article, and you will find that I said: "the nature of the red matter . . . . is a subject which requires further investigation."

[5] See Da Rio, op. cit., t.c., pag. 334.

You see, then, that I was in doubt, and never asserted that the red coloring was a product of fermentation, since in only forty-eight hours I could not make enough observations to decide the nature of this substance. Melo, however, not paying careful attention to the word "perhaps" has asserted that this reddish substance was a product of fermentation. He confesses that he is not a chemist,[6] and we shall not argue with him on this point; but he asserts that he has read chemical books and therefore considers himself in a position to maintain his argument with assurance. He has fallen into this error just because he drew a positive conclusion from my doubt, instead of observing closely the circumstances attendant on such a phenomenon.

He seems to base his deductions upon the results of observations with the microscope, but this method of inspection should be only accessory, when more exact methods are available which allow us to distinguish organic beings from ordinary matter. I shall now inform you concerning Melo's experiments to determine the nature of the red substance.

Having asserted that the phenomenon is a product of fermentation, in order to remove all question that this was the case and that it was not caused either by a very minute plant, or an animal of the lowest classes, he dissolved the polenta in water and observed the colored substance with a microscope, but never did it appear *filamentous* or *oscillating* and therefore he felt his opinion was corroborated. I do not say that he was mistaken because of this, but I do think that having a better method for elucidating the phenomenon, this ought to be preferred, since our senses may deceive us. To settle this question, I therefore chose another method, taking as my guide the original experiments of that very brilliant scholar, Spallanzani.[7]

I had observed that by placing a little piece of colored polenta in contact with ordinary polenta, even though freshly prepared, in a very short time the surface of the polenta turned red. Again, I found that by bringing freshly made, warm, polenta

[6] See Da Rio, op. cit., t.c., pag. 336.

[7] See Spallanzani Opuscoli di fisica animale e vegetabile.

near the colored polenta, the red spots appeared, although there had been no actual contact. To obtain the coloring in this last case, I placed the red piece of polenta so that it would be in the physical center of a circle a little more than 2 inches in diameter, whose perimeter was formed by freshly prepared polenta. The central piece, then, was about an inch away from the uncolored polenta; but even in this case the uncolored polenta became red, and in a shorter time than in the preceding experiments.

I wanted next to see if the influence of the red polenta on the other polenta would continue to be manifest even if the distance were still greater, and if its effects were exercised in all directions.

I took, therefore, a glass globe whose diameter was 16 inches, and which had four apertures an inch wide, arranged in the form of a cross; that is, corresponding to the extremities of two axes, crossing each other at right angles. In this sphere or globe I suspended a little piece of colored polenta so that it would be in the physical center of the globe, and in each of the four apertures I placed a bit of freshly prepared polenta, while these pieces were still warm. In the course of a few hours, the red color showed itself to an equal degree in all directions, since all four pieces were colored in a like manner.

It seemed to me that this potent influence of colored polenta could not be ascribed to fermentation, since I cannot understand how polenta in three or four hours gives rise to a putrefaction capable of producing the phenomenon. Let it be said, moreover, that polenta so colored does not mislead us, by showing only the *mucilaginous substance tinted with red*, as it appeared to Melo, since there are visible also many clusters of very small hemispheres so that the surface looked like a substance sown with very minute pustules. Such experiments and observations led me to suspect from the beginning that the phenomenon might be produced by an organic being, rather than by fermenting matter.

If, therefore, the reddish substance were a living organism, it must be either a little animal of the class of the infusoria or a

very minute plant. Following the experiments of Spallanzani, if the colored matter resulted from an infusorian, I could kill it by exhalations of some volatile substances. If, therefore, before making the experiments, I subjected the red polenta to such exhalations, it could no longer exercise any coloring influence on fresh polenta; since, once the animals were killed by these deadly fumes, they could no longer generate those little eggs which, carried by the air, gave rise to a numerous progeny on the polenta on which they alighted.

That great naturalist, Spallanzani, found camphor vapors were the most deadly to animals of the class of infusorians.[8] Therefore, before doing anything else, I subjected the piece of colored polenta to a very strong camphor vapor and then repeated the experiment with this bit of polenta; but in spite of this the red coloring appeared as heretofore. I obtained like results even after subjecting the colored polenta to the strongest odors of turpentine and of tobacco; and only after prolonged subjection to sulphur fumes was the power to produce the phenomenon taken from the colored bit of polenta. Still I could not draw a sure deduction from this, since the strong acid produced in this case might well injure the germs of microscopic plants, in case these latter were the cause of the phenomenon. Indeed I must say that this was my principal doubt, and so I continued to follow the path of Spallanzani, who determined the degree of temperature at which the germinating faculty of certain seeds would cease.[9] If I, then, could deprive this colored polenta of its germinating faculty with a certain degree of heat (but never so great as to burn the polenta), then I would have valid reasons for concluding that the phenomenon was the product of a vegetable being.

I took, therefore, a little glass globe, and suspended my bit of colored polenta in its center; then I closed it with a cork through which I passed a small thermometer, the bulb of which was very near the colored polenta. After having sealed the

[8] See Spallanzani Opuscoli di fisica animale e vegetabile, tom. I, cap. VII, pag. 101.

[9] See Op. cit., cap. IV, pag. 45, 46, 47, ecc.

neck of the globe, I raised the temperature up to 80° Reaumur° and I left it at this temperature for ten minutes. Then I took this bit of colored polenta and repeated the ordinary experiments; but the red color appeared just as soon and just as bright as before.

Seeing then that if this phenomenon was the result of a very minute plant, even 80° were not sufficient to deprive its seeds of vitality, thus I wanted to subject them to still greater temperatures to see if they would be made incapable of reproducing their kind. I buried the globe in sand, and at first raised the temperature to 100°, but finding no sensible difference in the results, I made another attempt and raised the temperature to 120°, and left the colored polenta at such a heat for only five minutes. Although in this last experiment I reduced the time to a half of that allowed in other experiments, yet it was sufficient, and perhaps too much so, to kill entirely the reproductive germs, and thus to prevent the red polenta from exercising any influence at all on the uncolored polenta although they were placed in actual contact. I repeated this experiment several times, always with the same results. Therefore this reddish substance obeys those laws to which Spallanzani found vegetable seeds subject. Reason, based on analogy, thus permits us to infer that this colored matter which grows on polenta is indeed among the lowest types, but is nevertheless a vegetable being.

I ought not to omit to say, however, that Spallanzani kept the spores of ordinary molds first at boiling temperatures and then at that of red-hot coals. In spite of such an intense heat, he affirms that the spores retained their germinating faculty.[10] In these experiments, however, he does not indicate the exact temperature of the coals, so that we do not know whether the degree of heat that killed the germinating faculty in this case was greater or less than that used by Spallanzani. It is certain that if the spores of these molds were exposed to red-hot coals, the decomposing power of the heat would have exercised its influence over them, and the entire mass of spores would have

[10] See Spallanzani, op. cit., tom. II, pag. 271.

been burned. Let it be added, moreover, that it is not easy to observe any difference in the growth of molds on sown substances from that on a body not sown with spores. This difficulty, in a large measure overcome by the singular skill of the great naturalist, has nothing to do with the case of my plant which under like circumstances grows on a substance on which seeds have alighted but not on one that is unseeded. I leave it to others to judge whether the path followed for this investigation into the nature of the colored matter is better or more certain than that followed by Melo. For my part I am not at all convinced by Melo's experiments and still less by the reasoning he sets up before ascertaining the true nature of the plant under discussion. These are his words:[11] "I am strengthened in this opinion by the fact, that if the red color of the polenta depended on some little plant this could be none other than a *Byssus*[d] or else a *Mucor*," as if, I may add, the Supreme Being could not create others of these microscopic beings besides the *Byssus* and *Mucor*. I feel sure that no one can accept such strange reasoning in regard to natural things. But he later informs us that that which produces the phenomenon is neither a *Byssus* nor a *Mucor*, and depriving us of a suspicion that it may be *Aegerita crustaceae*, he concludes that it can be nothing but a product of fermentation, concerning which I have already exposed the error.

Having now removed all doubts as to the nature of the colored matter, we have now to determine to what class of plants it belongs. And having instituted a rigid examination for this purpose I am inclined to place it in the order of fungi, possessing, as this plant does, all the characteristics pertaining to this order. Wishing to classify it more in detail, I find that, according to Bulliard's method, it belongs to the third group, in which, however, there is no type to which it can be referred. If I follow Persoon's system, then my plant belongs to the second class and to the fifth order; but neither here is there any type under which it can be classified, and I am therefore constrained to create a new genus.

[11] See Da Rio, op cit., t.c., pag. 340.

I thought it well to distinguish this new genus by the name Serratia to recall better[12] thereby to the memory of Italians the name of a celebrated physicist, whose memory is neglected so that we attribute to the foreigner that which exclusively belongs to us. Serafino Serrati was the first who plied a steam boat on the Arno,[13] and so, whatever be the merits of the claims of those beyond the sea, that of the invention certainly cannot be accorded to them. I therefore, have chosen to call the new plant by the name of Serratia to honor in this way the memory of this great physicist. The following are the generic and specific characteristics of the plant.

SERRATIA*

Funguli acaules, semisphaerici, capsulis confertis. S. Marcescens. Vesicula tenuissima latice primo roseo, dehinc rubro repleta.

I have distinguished my *Serratia* by the name *marcescens*, since as it reaches maturity (which is effected in a few hours) it decays immediately, dissolving into a fluid and viscous matter which has a mucilaginous appearance. This fact led Melo into error, as on seeing this substance, he without examining it, considered it a gum or mucilage, and so thought the phenomenon depended on the coloring only. He surely would not have been drawn into such a mistake, had he studied closely this tiny new plant in all the stages of its life, all of which stages are passed through in a few hours. If he had studied it in this way, he would have seen it in its early stages of development colored light pink, which changes into a dark purplish red,[14] a sign of the end of the plant's life.

[12] I have used the word *better* because the eminent Professor Pozzi has just taken occasion to recall Serrati with pride, and makes mention of him still more recently in his Dizionario di fisica e chimica, tom, II, pag. 308.

[13] See Lettera di fisica sperimentale, edizione di Firenze, anno 1787.

[14] Perhaps its beginning precedes this appearance of the aforementioned color a little, and I could mention some facts to support this belief, but since positive observations can only be made at the time when the color begins to appear, so I begin from this point, leaving out of account those first signs of life which appear before it becomes red.

If we examine it carefully in those brief moments of life assigned to it, we see nothing but little red spots formed by an aggregation of very minute, stemless fungi, covered with a very thin and clear skin, which under a microscope show some spots which appear of a duller hue scattered here and there. Seeing this, I suspected that the reproductive germs were perhaps contained in these spots. If we wish to use the reasoning based on these experiments, we see the doubt has been so clarified that to persist in suspicion would smack of over subtility. In fact, if the little seeds, or to use a modern botanical term, "spores," whereby the *Serratia* is reproduced, did not exist in individual cells in the skin, how could they be disseminated in the air and so alight on polenta placed at a distance? If, on the other hand, these seeds were in the interior, they would be held in the viscous fluid which is there contained, and could no longer fly through the air, and reach a distant substance on which to reproduce themselves. If this were the case, reproduction could be possible only by means of actual contact which fact has been disproven by experiments.

Let us suppose, then, that the more highly colored spots of the surface layer be so many tiny cells, which burst on reaching maturity. In such a case a mass of very minute seeds perhaps invisible even under a microscope, will be set free, and falling on those substances which possess the necessary characteristics for their development, will give rise in a short time to our little plant.

Even if the seeds are freed by the bursting of the little vesicles still not a few are retained and are absorbed in the rapid dissolution of the little plant, while some remain in the viscous fluid that is formed. Wherefore if the surface of a piece of paper be brought in contact with this fluid, the paper acquires the power to produce very rapidly our colored substance on polenta, in the same way as did the bit of colored polenta, except that the paper is effective only if it is in actual contact with the polenta. This, then, serves as a proof of the existence of cells in the surface layer of the *Serratia*, and also of their function. In fact, if there are on the polenta, already colored

and moistened before the experiment, some little plants in vegetation (a thing which we believe to be the case) these must hurl their seeds and propagate the species on bodies even if they be at a distance. This cannot occur in the case of ordinary paper that has been soaked, since it contains seeds immersed in the dried fluid, and these cannot become detached from the paper, and so contact alone can bring about reproduction.

Perhaps there are some who will not understand why the development of the phenomenon takes place sooner when we use a colored piece of polenta instead of paper soaked in the fluid. And in fact, Spallanzani,[15] sowing ordinary molds did not discover this precocious sprouting, and observed only a very slight difference between the germination of molds on inoculated substances and that on uninoculated material. In our case, however, it is well to note that the *Serratia* seeds are not found in the air in such great abundance as for example, the *Mucor* spores. Therefore, to get the coloring on polenta we must wait for several hours; an interval, which, however, is not due to the development of the plant, but rather to the time required for the air to bring the seeds in contact with the substance to be colored,—a period of time which is no longer necessary if we have recourse to methods explained above.

A very convincing proof of this may be obtained by repeating the first experiment described. In this case the piece of polenta under the globe will very often become colored only on one side, even after an exposure of eighteen to twenty hours. On this side there appear some spots constituting a stain, which spreads in a short time without any relation to the original piece of colored polenta, without which the first colored spots would be impossible. Very often the reddish color begins at only one point and gradually extends itself; nor can we always see any other spot on this same piece of polenta. I do not know how Melo can explain this phenomenon satisfactorily, which also occurs frequently with fermentation; since there can be no doubt that the colored bit of polenta is in equal relations to the other pieces. Therefore, he will never be able to tell us

[15] See Spallanzani, op. cit., tom. II, pag. 267, 268, 269, 270.

why all parts should not show a like fermentation. I am very sure that he will find it very difficult to explain this observation unless he abandons his first idea in regard to the matter. Indeed, if he agrees, as now he can no longer deny, that the colored matter is a plant, then he can tell us that only that portion on which the seeds fell became colored. And as the first plants to germinate reached maturity, they reproduced themselves and multiplied excessively, until with the rise of other molds, giants compared with these plants, these latter were suffocated and killed.

Spallazani thinks the germinative faculty of the seeds lasts many years.[16] In this regard, I can state only that the *Serratia* seeds as preserved in the paper, germinate after three years. I repeated these experiments every year, taking for the purpose a piece of polenta, still a little warm, which I placed under a glass globe on paper soaked in the colored substance. Each year I saw the *Serratia* develop as in 1819.

The power to preserve the seeds possessed by the impregnated paper is also possessed by wood, and perhaps by other substance soaked in the fluid. This observation explains how in the home of Pittarello of Legnaro and other farmers the polenta became colored in the period of a few hours. Indeed, in addition to supplying the conditions necessary for the development of the plant, these farmers, without realizing it, were sowing it by placing the polenta on the same board and in the same cupboard. In such a case the wood must receive some of the seeds, whereby the phenomenon was reproduced on the polenta that came in contact with it.

After having entertained you at such length on all that which concerns the life and history of this organism, I think it will please you to know something about the properties of the pigment which constitutes the greater part of the fluid of the *Serratia.*

The pigment is insoluble in water, and is dissolved readily in alcohol, even at ordinary temperatures. The solubility of the colored pigment in alcohol is another argument against

[16] See Spallanzani, op. cit., tom. II, pag. 272 e 273.

Melo's opinion, that the colored matter is mucilaginous. Thus we see that the fallacy of his reasoning becomes patent whether we have recourse to physics or chemistry. But to speak no longer of him, already sufficiently confuted, I wish to say that, having obtained the pigment by the method described, I was able to dye some silk and wool with the aid of ordinary mordants, so that I obtained some red shades, beginning with a delicate, pale red to a dark, purplish red. Having seen that, I thought I could derive some practical benefit therefrom, but further tests dissipated my hopes; since I found that light had a very powerful effect in decolorizing the tint produced by the new substance. And although the colored objects were not exposed directly to the light, still in the course of seven or eight months they faded, and after a year and a half almost every trace of color was lost, there remaining in its stead only a light yellowish shade.

On thinking about this I thought that perhaps the substances used as mordants might have contributed to the fading, and that possibly light was not the only decolorizing agent. To clarify this doubt, I colored some silk and wool without the use of mordants, and found that the fading occurred much sooner, and that direct light is so effective as to cause the color to disappear in a few moments.

What seemed singular to me was that light does not affect the color when it is associated with the plant. This leads me to think that there is some other principle which shields it from the force of light.

This is all that I have to say to you about the phenomenon which gave rise to so many strange ideas and fears, and I close with expressions of highest esteem.[t]

TRANSLATOR'S NOTES

[a] This letter originally appeared under the following title a little more than one hundred years ago in a journal published at Venice, Italy: Lettera di Bartolomeo Bizio al chiarissimo canonico Angelo Bellani sopra il fenomeno della polenta porporina. Biblioteca Italiana o sia Giornale di Letteratura, Scienze, e Arti, Tomo 30, Anno 8, Aprile, Maggio, Giugno, 1823, 275–295.

[b] Five experiments are reported in the article to which Bizio refers. In these he developed the red coloring on polenta in foul and in moist air, and found that it did not develop well under dry conditions. The article appeared anonymously but is later claimed by Bizio here and elsewhere.

[c] 212°F. or 100°C.

[d] *Byssus* a generic term of this period meaning a "thread" applied to various *Fungi imperfecti*. *Mucor*, the black molds, a generic term, used in a somewhat looser way than it is today.

[e] *Serratia*. Small, stemless fungi; hemispherical capsules occuring in clusters. *S. marcescens*. A very thin vesicle filled at first with a pink, then with a red fluid.

[f] A two and a half page note by Bellani follows this letter. In this, he discusses the possibility that the reddening of a pool of stagnant water that he observed in the fall of 1819 was caused by the same organism. This pool called by the peasants, "the red sea" evidently contained certain red algae.