INSTITUTE FOR THEOLOGICAL ENCOUNTER WITH SCIENCE AND TECHNOLOGY (ITEST) NEWSLETTER

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Announcements:

First, let us in the ITEST office wish you a joyous, peace-filled New Year. We wish you also a successful new decade.

For Your Calendar:

ITEST's Spring, 1980 Workshop will be held at Fordyce House (St. Louis) on March 14-16, 1980. The topic is "The State of the Art" in several major disciplines and professions. We are asking our "faculty" to discuss "where the discipline (or profession) is now", "where it will be in five to ten years," and "what implicit (or explicit) view of the human is operative. The disciplines are sociobiology (Richard Blackwell - Saint Louis University), political science (James Wiser - Loyola University, Chicago), neuroscience (Robert White, M.D. - Case Western Reserve University); the professions are law (Dennis Tuchler - Saint Louis University), medicine (Robert Herwick, M.D. - San Francisco) and politics (The Honorable John Schneider - Missouri Legislature). Invitations will be sent out in a few weeks. Please note the date, March 14-16, 1980, on your calendar.

The October Conference will follow the recent policy of reprising the March Workshop of the previous year. Thus, the topic of the October 3-5, 1980 Conference will be "Governmental Intervention and Regulation." We shall endeavor to bring together the March, 1979 "faculty" and two speakers to extend the discussion.

For March, 1981, the Workshop will be devoted to the topic of Recombinant DNA. We are planning to bring together a scientist working on recombinant DNA, lawyers involved in the patent suit now before the Supreme Court, someone from biological industry, someone from the electronic media, and an ethician. If you have any preference (or suggestions) on the selection of the "faculty", please let us know by February 15th. We would appreciate your help to make this as good a program as possible.

ITEST News:

The response to the current membership drive (for calendar year 1980) has been excellent. We have received about 260 renewals so far. This is well ahead of the response of last year, which was a record year for membership. Please send us your membership application/renewal now, if you have not yet done so.

Beginning with the next issue of this Newsletter, we shall institute a new feature. Part of the purpose of this Newsletter is the interchange of information. We shall begin listing the articles published by our ITEST people on science and theology. In the next issue we shall initiate this with those who inform us of

their publications by February 20th. Please help us with this effort by sending us a list of your publications.

THE SCIENTIST AS A CHRISTIAN
(Fiducial Service)

by

Fr. Lawrence Barry, S.J.
Newsletter Editor, ITEST

Father Walter Ong, S.J. has pointed out a parallel between some of the concepts on the "Scientist as Christian" (cf. ITEST Newsletter, Volume 10, No. 3, July, 1979) and some of the concepts developed in a talk of his on professionalism and fiducial service. His talk, the Presidential Address to the 93rd annual convention of the Modern Language Association, held in New York on December 28, 1978, was titled "The Human Nature of Professionalism."

Calling someone a professional is occasionally simply a reference to the fact that he or she is paid for what is done. It can, however, mean much more than that. To speak of "the professions" makes many people think of medicine and law. In the practice of these professions, people entrust themselves to those who are highly trained and qualified. To be a person so trusted in matters of life and death goes beyond payment. It represents a fiducial relationship in which the client puts himself into the hands of the professional.

Teaching and scholarship also include a fiducial relation. The pupil is entrusted to the teacher. People often base their decisions on the results of scholarship. In doing so they do not imagine that a teacher-scholar is either omniscient or infallible, but they do regard him or her as qualified, trained, and faithful to the canons and demands of his or her field of study.

Father Ong related this question of trust to his own Christian commitment:

> The concept of professionalism as fiducial service is certainly helpful to me in relating my own dedication as a Jesuit priest to my academic profession. The Christian ministry is not simply a profession; it is a personal dedication based immediately not on learning but on faith. In the Bible and in the church's tradition the analogue for the ministry, as for any act of faith, is not a profession but a marriage. Matrimonial dedication does not involve intensive academic training, but it does involve a fiducial relationship at an ultimate depth. It is not difficult for me, nor has it been for many thousands of others, to relate the fiduciality of the Christian ministry -- a word meaning service, diakonia -- to the fiducial relationship of scholarship and teaching. The Catholic faith has no right to supplant or to interfere with other fiducial relationships, but if it is truly Catholic, it is not a stranger to them. Trust respects trust.

I would like to relate this question of trust and of fiducial commitment to the question of a scientist who is a Christian. Christianity is no stranger to trust and to the integrity that trust demands. A scientist

must be true to the dynamics of his or her discipline. Were a scientist to forge or mutilate evidence to make his or her science more in accord with what he or she thinks are the demands of religion, or some other supposedly higher call or cause, he or she would violate trust. He or she would actually be serving neither the cause of religion nor his or her own personal integrity, to say nothing of the service of the science. No matter how sincerely a person may believe, and no matter if his or her beliefs actually be true, most people would regard dishonesty or the suppression of evidence in favor of these beliefs as violations of trust, even though it may later be found that even his or her scientific conclusions happened to be correct.

It can be said that truth is one, but this does not mean that human beings do not need many different sciences in order to know and understand their world. God is truth, and the source of all truth; in this sense truth is one. Also, the dynamics of the human mind are at work in each science in a way that is generally similar. Neither a science nor any other human endeavor is autonomous in the sense of enjoying complete freedom from previous history, present attitudes, and the personalities of those doing the work. No knowledge is so objective that it can get along without knowers. This does not imply, however, that there cannot be different sciences, each with its own independent set of concepts and its own demands. Those who are professional in such sciences are worthy of trust because they are qualified, trained, and respectful of these specific demands.

It seems as if loyalty to a fiduciary commitment has two sides. The first side is the docility of a pupil in the hands of the teacher. The second side is the integrity and competence of the teacher and his or her loyalty to the profession. The Bible speaks of the faithful servant. This reference makes us think of the second aspect of a fiduciary commitment, namely, that of integrity and competence, rather than of a person who simply accepts what someone else says. Faith usually refers to the acceptance of something on the word of another, but faithfulness has a further dimension: integrity and competence. "Faith" has also come to have another, and unfortunate, meaning, namely, that of a leap in the dark. That phrase can be understood to refer to an irresponsible acceptance of arbitrarily selected beliefs because they seem attractive. One thinks of the person who believes in astrology because it gives a sense of assurance or of the young people who believed in Hitler because he offered them a vivid program.

We have distinguished two different demands of faithfulness: one set of demands on the teacher, another on the pupil. Throughout most of our lives, however, we must meet both demands. We always have to accept facts on the authority of other people while we also have to practice integrity and loyalty to what we are. This loyalty to what we are and to the operations of our own mind pervades all human knowing. It offers a basis for saying that knowledge is one. The problem of skepticism can illustrate this because the issue of loyalty to what we are can have a surprisingly sweeping effect on this problem. We shall try to show how recognition of what we are and of our own condition can quickly reduce the assertion of skeptical claims to incoherence.

When we ask questions, we can ask them only in the context of our own knowing. In other words, we can judge the actions of others on a third-person basis, but we can judge our own knowledge only on a first-person basis. Since all our questions are framed within the context of our own knowing, it is nonsense to attempt a denial of our own knowing. We can use the whole context of our knowing to discover errors in its parts, or to try to improve a reflexive knowledge of the whole itself. When we think of an explanation, we reflect on how well we have mastered the situation and whether or not our knowledge

of the evidence in favor of this explanation closes the case and calls for affirmation or rejection. If we attempt a rejection of the whole of our knowledge, however, we reject the basis for knowing what our rejection means as well as all of our reasons for making it. We can deny our knowing indirectly by a denial of our ability to attain the goals that define successful knowing. If we try to deny knowledge of them, we deny that we know what we are talking about when we make the denial.

There are many complications in the problem of skepticism, but the path to it can be short and simple. We can consider such terms as knowing, things, nature, and reality as if they were outside the context of our knowing and then demand that we show that we really do know them. This mixes a third-person basis with a first-person basis. We can set up demands for valid knowing on a third-person basis, i.e., a relation between the whole of our knowing and things out there. Then we discover that we cannot meet on a first-person basis, i.e., in terms of the context of our own knowing, demands that can be met only by an observer outside of us (or, then, on a third-person basis), and so we seem forced into skepticism. A better alternative would be not to pretend that we can really paint ourselves into such a corner in the first place.

The Platonic tradition seems to have fallen into a similar trap. It started with an idealistic definition of what "real knowledge" had to be, then asked whether or not we possessed such knowledge and sometimes reached a negative conclusion. We are more loyal to our own condition when we recognize that we make definitions of knowing only within the context of what we have done. If we find that we do not actually perform according to our definition of "real knowledge," we would do better to revise our definition than to turn to skepticism. Is knowledge, then, a matter of faith? I hope I have indicated how knowledge is a matter of faithfulness in the sense of integrity, but not in the sense of accepting everything from others or in the sense of taking a leap into the dark.

In the sciences, as well as in religion, people must be alert, intelligent, reasonable, and responsible. This is not a golden path to omniscience or infallibility, but it indicates a loyalty to what we are. This loyalty pervades all of our knowing, and in this sense knowledge is one. Those general prescriptions, however, do not decide specific scientific methods or concepts. Such methods and concepts need have no logical relation to those of another science. Thus we need not bother to look forward to the day when all sciences are reduced to one great science. The 19th century mechanists seemed to be looking forward to such a reduction, and this was illustrated by the description of Laplace's demon, who knowing perfectly the positions and velocities of every elementary particle in the universe, as well as all the laws of mechanics, could then predict the whole future course of the world. Some metaphysicians also became involved in a pseudo-unification of knowledge by claiming that they had the kind of knowledge of reality as a whole that enabled them to determine for every science its area and its basic concepts. This was illustrated in the conflict between Newton and Descartes when Newton refused to limit himself to the use of the concepts given to him by Descartes' philosophy.

Despite some dependencies, sciences can be called autonomous in that there can be sciences that will never be reduced to another science or be a part of one great overarching logical structure. The integrity of a professional is a human integrity in that he or she is loyal to his or her human condition in all his or her knowing; but it is also specific in that within this human context, sciences make specific demands. For a scientist to be loyal to both of these is to be loyal to himself or herself, to others, and to God.

NOTE: By coincidence we have received a copy of an article, "Academics and Their Profession: Toward an Ethical Clarification," written by George Schurr of the Center for the Study of Values at the University of Delaware. Since this article will appear in The Christian Century we shall not excerpt it now. Perhaps we shall be able to reprint it in full in a future issue of the Newsletter. Dr. Schurr's treatment of academic professionalism is excellent, and bears some points of contact with the article of Fr. Barry above.

A KNOWLEDGE EXPLOSION

by

Fr. Lawrence Barry, S.J.

This small example of an explosion of knowledge is a report of an incident where scientific work on the problem of drug addiction blossomed into a much broader understanding of the chemistry of the human brain. An account was given on the television program NOVA under the title, "The Keys of Paradise." It is interesting not only as an account of discoveries that could be used in changing human behavior, but also as an example of how an attempt to solve a particular practical human problem demanded and opened the way to a much broader understanding of the chemistry of the human brain.

The original problem was drug addiction, which in the late 1960's assumed almost epidemic proportions. At that time President Nixon allocated special funds for research into its causes and cures. There was a clue that seemed to promise to be a key to an understanding of heroin. It turned out to be a key in more ways than one. The morphine molecule has two forms, whose structures are related like a key and its mirror image. One form is a powerful drug. This is the form found in morphine and heroin. The other form, the mirror image of the first, is completely inactive. This indicated receptors in the brain and also indicated that these receptors would accommodate the morphine molecule in a way similar to the way a lock is made to accommodate a key.

The left-handed molecule was composed of the same atoms and had the same structure as the right-handed molecule, but one was a mirror image of the other. The left-handed molecule was a powerful drug, while the right-handed one was completely inactive. This inactive molecule was apparently like a key that did not fit a lock. The left-handed molecule had a powerful effect on the nervous system, and so seemed to be a key that did fit the lock. The investigation then became a search for the "lock" or for the receptor. The likely place for such receptors was the synapses.

The technique was: to homogenize rat brains, separate the cells from the area of the synapses, allow them to combine with radioactive morphine molecules, wash them, and then check to see if the material was still radioactive. The presence of radioactivity would confirm that some radioactive molecules survived the washing, and so must have been tightly bound to the material. A fraction was found that was still radioactive after the washing.

This confirmation of the existence of receptors pushed the research beyond the drug problem. If there were such receptors in the brain cells, then it seems likely that there should be some chemical very much like the morphine molecule that was a part of the brain's chemistry and that fit into the morphine receptor. The knowledge of such a chemical would be even more important than an understanding of drug addiction.

The treatment of drug addiction, however, provided another tool, namely, the morphine antidote, noloxone. An addict in a coma could quickly be brought around by an injection of noloxone. Apparently this drug had a more powerful affinity for the morphine receptors than morphine, so it replaces the morphine and stops its effects.

There are other forms of pain relief: electric shock, stimulation, acupuncture, and placebos. Could noloxone cancel their effects? It turned out that it could. In mice, the threshold of pain, raised by electric stimulation, was promptly returned to normal by noloxone. Acupuncture could relieve tooth pain in humans, and its effects were cancelled by noloxone. Later in the investigation, placebos (a harmless inert substance that the patient thinks is an active substance) were given to some human patients with minor pains. In this investigation, the injections were numbered so that neither the doctor administering the injection nor the patient knew whether the injection was a placebo, noloxone, or morphine. The placebos relieved the pain. Their effect, as well as that of morphine, was cancelled by noloxone. It seemed to the investigators that there was some chemical produced by the brain that had an effect like that of morphine.

The further search for this chemical involved the use of thousands of pig brains in order to separate as many different kinds of cells as possible. They were purified and re-purified and then tested with tissue from the vas deferens of a mouse. This tissue will contract with an electric shock. Morphine reduces the contractions and noloxone restores the contraction to normal. The task for the investigators was to find which of the cells from the pigs' brains would act like morphine. After six months -- in a last minute check of some fractions before they were to be thrown out -- some of them showed the effect. Two vas deferens were used. Both were exposed to the fraction; both had their contractions slowed down. Then one was exposed to noloxone, while the other was not. The contractions of the first returned to normal while the second remained slowed.

The chemical produced in the brain which acted like morphine had been isolated; it was called enkephalin. The next step of the research was to find its structure. After about a year's work, the structure was determined to be a peptide (a string of amino acids). It was estimated that it was a string of ten or twenty such acids. At a meeting the investigators learned of a new method of identifying peptides using a mass spectrometer. The peptide was identified as not one but two pentapeptides (strings of five amino acids). The peptides were then synthesized and successfully tested on the mouse vas deferens.

The project then expanded further. Other researchers were working on peptides placed into circulation by the pituitary gland. Two teams, one in San Francisco and one in London, had identified a large peptide released by this gland. It turned out that this long peptide broke up so that the two pentapeptides of enkephalin were released. The longer peptides were called endorphins, a word formed by a contraction of the words indogenous morphine. These peptides can last several hours in the body. The enkephalins were found in the brain, the spinal cord, and the gut; but they last only a few seconds in the body.

While the endorphins and enkephalins are promising as pain killers, their applications seem to go far beyond that. For example, they seem to be related to sex. Pregnant women show a large increase in both as they approach labor. It has been suggested that the levels of endorphins and enkephalins are high in the fetus in order to slow down the metabolism during birth. Also, endorphins and enkephalins seem to be involved in some mental illnesses, while noloxone seems to help in their treatment.

There is still a great deal to learn about the enkephalins and endorphins. There is speculation about "happiness pills," pills to cure various kinds of addictions, to ease pain, to reduce stress, and pills to cure impotence. Apparently the pharmaceuticals companies do not regard this type of speculation as completely idle. They are filing patents furiously in this area and entering into lawsuits. Many think that this research on the endorphins and enkephalins represents a major scientific (and technological) breakthrough and that it will be a long time before the full implications of this work are fully known. It can be safely assumed that there will be a significant impact both on our understanding of the human and on our lives.

SCIENCE AS A QUEST FOR BEAUTY

by

Fr. Lawrence Barry, S.J.

Objectivity, logic, hard evidence, and an almost automatic thought process have at times been associated with scientific work. At times this hard and almost automatic way of thinking is contrasted with the humanities or with a subjective, emotional, and a human way of thinking. This view has been at least mildly dominant, but has often been challenged.

In Physics Today for July, 1979, S. Chandrasekhar has an article entitled "Beauty and the Quest for Beauty in Science." In this article he argues that "science, like the arts, admits aesthetic criteria; we seek theories that display 'a proper conformity of the parts to one another and to the whole,' while showing 'some strangeness in their proportion.' " He uses quotations from scientists as well as historians of science to back up his claim.

Poincaré, a French mathematician of the late nineteenth and early twentieth centuries wrote:

> The Scientist does not study nature because it is useful to do so. He studies it because he takes pleasure in it; and he takes pleasure in it because it is beautiful. If nature were not beautiful, it would not be worth knowing and life would not be worth living.... I mean the intimate beauty which comes from the harmonious order of its parts and which a pure intelligence can grasp.

The author of biographies of Newton and of Beethoven, J.W.N. Sullivan, has commented on Poincaré's observations as follows:

> Since the primary object of the scientific theory is to express the harmonies which are found to exist in nature, we see at once that these theories must have an aesthetic value. The measure of the success of a scientific theory is, in fact, a measure of its aesthetic value, since it is a measure of the extent to which it has introduced harmony in what was before chaos.
>
> It is in its aesthetic value that the justification of the scientific

> theory is to be found, and with it the justification of the scientific method. Since facts without laws would be of no interest, and laws without theories would have, at most, only a practical utility, we see that the motives which guide the scientific man are, from the beginning, manifestations of the aesthetic impulse.

However the art critic, Roger Fry, is quoted as posing a difficulty to Sullivan.

> Sullivan boldly says: "It is in its aesthetic value that the justification of the scientific theory is to be found and with it the justification of the scientific method." I should like to pose to S. (Sullivan) at this point the question whether a theory that disregarded facts would have equal value for science with one which agreed with facts. I suppose he would say No; and yet so far as I can see there would be no purely aesthetic reason why it should not.

The reply to this question was given in a series of examples: first, a scientist had wanted to affirm a law or theory that appealed to him aesthetically but then abandoned it as not true: later scientific progress eliminated the evidence against the law and verified the first instinct. One such example is Weyl's gauge theory of gravitation:

> I inquired of Dyson whether Weyl had given an example of his having sacrificed truth for beauty. I learned that the example which Weyl gave was his gauge theory of gravitation, which he had worked out in his Raum-Zeit-Materie. Apparently Weyl became convinced that this theory was not true as a theory of gravitation; but still it was so beautiful that he did not wish to abandon it and so he kept it alive for the sake of its beauty. But much later, it did turn out that Weyl's instinct was right after all, when the formalism of gauge invariance was incorporated into quantum electrodynamics.

The author gives other examples and other statements by scientists of their research for beauty in their work. He summarizes:

> We have evidence, then, that a theory developed by a scientist, with an exceptionally well-developed aesthetic sensibility, can turn out to be true even if, at the time of its formulation, it appeared not to be so. As Keats wrote a long time ago, "What the imagination seizes as beauty must be truth -- whether it existed before or not."

In offering an explanation of why this is possible he quotes Plato that beauty is "not imparted to it (the soul) from without by the senses, but has always been already laid down there in the deeply unconscious region." The author seems to think that the same thought is being expressed by David Hume's statement: "Beauty in things exists in the mind which contemplates them." This seems to be

using Hume in a rather back handed way. Kepler is more in the Platonic tradition and he is quoted from his Harmony of the World:

> To this I answer that all pure Ideas, or archetypal patterns of harmony, such as we are speaking of, are inherently present in those who are capable of apprehending them. But they are not first received into the mind by a conceptual process, being the product, rather, of a sort of instinctive intuition and innate in those individuals.

He follows this by Pauli's comments on Kepler:

> The bridge, leading from the initially unordered data of experience of the Ideas, consists in certain primeval images pre-existing in the soul -- the archetypes of Kepler. These primeval images should not be located in consciousness or related to specific rationally formulizable ideas. It is a question, rather, of forms belonging to the unconscious region of the human soul, images of powerful emotional content, which are not thought, but beheld, as it were, pictorially. The delight one feels, on becoming aware of a new piece of knowledge, arises from the way such pre-existing images fall into congruence with the behavior of the external objects.

The author's definition of beauty is a combination of the criterion of Francis Bacon: There is no excellent beauty that hath not some strangeness in the proportion!" with the formulation of Heisenberg "Beauty is the proper conformity of the parts to one another and to the whole." The combination implies that the theory reaches conclusions that seem strange and startling; yet on examination of the theory its parts fit together in a way that is far more logical and convincing than previous theory. He uses relativity as an example of this. It shows strangeness in its joining together of time and space, of energy and matter, and it also made other surprising predictions. Yet it is more coherent than Newtonian theory which was flawed by Newton's implicit acceptance of an infinite velocity of light and an instantaneous action at a distance.

> But that was not Einstein's way: he sought, instead, for an exact theory. And he arrived at his field equations by qualitative arguments of a physical nature combined with an unerring sense for mathematical elegance and simplicity. The fact that Einstein was able to arrive at a complete physical theory by such speculative thought is the reason why, when we follow his thoughts, we feel as "though a wall obscuring truth has collapsed" (Weyl).

The author quotes Roger Fry again in support of his position on the role of the beautiful in science. Roger Fry is describing the similarity and also the difference between art and science. The author seems

to miss some of the significance of the differences that Fry brings out:

> In science the inevitability of the relations remains equally definite and demonstrable, whether the emotion accompanies it or not, whereas, in art, an aesthetic harmony simply does not exist without the emotional state. The harmony in art is not true unless it is felt with emotion.... In art the recognition of relations is immediate and sensational -- perhaps we ought to consider it curiously akin to those cases of mathematical geniuses who have immediate intuition of mathematical relations which it is beyond their powers to prove."

Fry seems to be saying that science is sometimes akin to or somewhat similar to art, but he also says that there is a difference. It could well be true that there are significant parallels between art and science but that they are not really the same thing or even two different parts of the same thing.

This is a possibility that the author does not treat. Also, his response to Fry's objection (that no matter how beautiful a scientific theory may be, it will be spurned if it is not also verified) consists in giving examples in which the aesthetic instinct turned out to be right after all. These do not eliminate the cases in which theories considered beautiful at one time have been rejected because they were shown to be false and were never redeemed. The examples cited actually appeal to eventual verification or what could be called truth-value to demonstrate the effectiveness of aesthetic qualities as indications of what might be true.

However, the author does add his voice to that of many others who have shown that the hard empiricist view of science does not do justice to its history. This view tends to make the human mind not only a blank slate but a passive blank slate with no direction of its own. Its activity is limited to making logical connections and deductions. Science is often regarded as the citadel of such hard headed empiricism. Chandrasekhar joins many others in pointing out that this hard headed empiricism does not fit science anymore than it fits anything else.

(Excerpt from a general discussion at the October, 1979 ITEST Conference on "The Technology of Social Control." These Proceedings will be sent to all dues-paid members when publication is complete.)

BRUNGS: One of the factors that is entwined in the whole picture (chemical food additives and pharmaceuticals) is that in our society there is an amazing rush toward the quick technological fix. I suppose this "salvational" aspect of technology has been growing for a long time. But we tend to see the refinement of old technologies or the creation of new ones as the answer for whatever problem we perceive we have. In that framework I'd like to shift the focus slightly to another aspect of this problem of drugs. There have been a couple of articles this year in Science on behavioral teratogens. There seems to be growing concern about the drugs and other substances women ingest during pregnancy. There seems to be the beginnings of tendentious data that suggest that, while these substances don't alter the gross anatomical structure of the child as thalidomide did, they do alter behavioral patterns. There seems to be a tendency

that more and more children show more aggression, hostility, overactivity when their mothers were ingesting some substances during pregnancy, while other substances seem related to underactivity or even passivity. I'd like to ask Dr. Moyer, or anyone else knowledgeable about this, to address my concern.

I'd also like to raise the notion that in much of our history we've developed our technology to try to insulate ourselves from the "forces of nature," from storms, from heat, from cold, and so on. Now it seems as if we have developed a wide range of products that alter us. So, if you will, we're going to have to develop a whole new technology to insulate ourselves from the environment we've set up to insulate us from the "forces of nature." This, of course, could be an endless cycle. Now we're going to have to protect ourselves from those protections we've set up. I suppose that all this really says is that, no matter how hard we work to protect ourselves, we are still terribly vulnerable.

My concern is that we have well begun creating a vast set of products that are going to demand social control to take care of the kinds of behaviors we may be fostering through the use of these chemicals. Is this fear reasonable?

MOYER: Absolutely yes. That is a reasonable fear. There are all kinds of chemicals. Were learning more and more about chemicals that are likely to influence behavior.

BRUNGS: Like the chemicals introduced into food?

MOYER: Many of the allergens that produce aggressive behavior in susceptible children are found in the food. There's good evidence that the artificial coloring that is put into food is particularly potent in producing symptoms of this nature in the susceptible child.

BRUNGS: Can it be said that this may be a far graver problem, in the case of, say, red dye number 2, than the carcinogenic effects?

MOYER: It may be very much worse.

HERWICK: A brief comment on an incredibly ironic case here. One of these dyes is called tartrazine. I believe that the FDA is going to start requiring that foods containing the yellow dye will be labeled with a warning label. One of its effect in the dermatological realm is, of course, that it produces urticaria (hives). Until about three years ago one of the chief drugs used to treat urticaria, a drug called Atarex, contained this dye. We received a letter from the drug company saying that we all would be glad to know that they had removed tartrazine from Atarex. It had been used for years.