Letters

Chaos in the Brickyard

Once upon a time, among the activities and occupations of man there was an activity called scientific research and the performers of this activity were called scientists. In reality, however, these men were builders who constructed edifices, called explanations or laws, by assembling bricks, called facts. When the bricks were sound and were assembled properly, the edifice was useful and durable and brought pleasure, and sometimes reward, to the builder. If the bricks were faulty or if they were assembled badly, the edifice would crumble, and this kind of disaster could be very dangerous to innocent users of the edifice as well as to the builder who sometimes was destroyed by the collapse. Because the quality of the bricks was so important to the success of the edifice, and because bricks were so scarce, in those days the builders made their own bricks. The making of bricks was a difficult and expensive undertaking and the wise builder avoided waste by making only bricks of the shape and size necessary for the enterprise at hand. The builder was guided in this manufacture by a blueprint, called a theory or hypothesis.

It came to pass that builders realized that they were sorely hampered in their efforts by delays in obtaining bricks. Thus there arose a new skilled trade known as brickmaking, called junior scientist to give the artisan proper pride in his work. This new arrangement was very efficient and the construction of edifices proceeded with great vigor. Sometimes brickmakers became inspired and progressed to the status of builders. In spite of the separation of duties, bricks still were made with care and usually were produced only on order. Now and then an enterprising brickmaker was able to foresee a demand and would prepare a stock of bricks ahead of time, but, in general, brickmaking was done on a custom basis because it still was a difficult and expensive process.

And then it came to pass that a misunderstanding spread among the brickmakers (there are some who say that this misunderstanding developed as a result of careless training of a new generation of brickmakers). The brickmakers became obsessed with the making of bricks. When reminded that the ultimate goal was edifices, not bricks, they replied that, if enough bricks were available, the builders would be able to select what was necessary and still continue to construct edifices. The flaws in this argument were not readily apparent and so, with the help of the citizens who were waiting to use the edifices yet to be built, amazing things happened. The expense of brickmaking became a minor factor because large sums of money were made available; the time and effort involved in brickmaking was reduced by ingenious automatic machinery; the ranks of the brickmakers were swelled by augmented training programs and intensive recruitment. It even was suggested that the production of a suitable number of bricks was equivalent to building an edifice and therefore should entitle the industrious brickmaker to assume the title of builder and, with the title, the authority.

And so it happened that the land became flooded with bricks. It became necessary to organize more and more storage places, called journals, and more and more elaborate systems of bookkeeping to record the inventory. In all of this the brickmakers retained their pride and skill and the bricks were of the very best quality. But production was ahead of demand and bricks no longer were made to order. The size and shape was now dictated by changing trends in fashion. In order to compete successfully with other brickmakers, production emphasized those types of brick that were easy to make and only rarely did an adventuresome brickmaker attempt a difficult or unusual design. The influence of tradition in production methods and in types of product became a dominating factor.

Unfortunately, the builders were almost destroyed. It became difficult to find the proper bricks for a task because one had to hunt among so many. It became difficult to find a suitable plot for construction of an edifice because the ground was covered with loose bricks. It became difficult to complete a useful edifice because, as soon as the foundations were discernible, they were buried under an avalanche of random bricks. And, saddest of all, sometimes no effort was made even to maintain the distinction between a pile of bricks and a true edifice.

BERNARD K. FORSCHER
Mayo Clinic, Rochester, Minnesota

Cancer: Ether-Soluble Substance

On reading the article "Cancer: a possible new approach" by Szent-Györgi *et al.* [*Science* **140**, 1391 (28 June 1963)], I was struck by the similarities between their findings and those of Reinke (*1*), which were later summarized by William H. Woglom (see *2*).

Reinke recorded an example of atypical epithelial growth which he had produced by injection of 4-percent ether into the eye of an adult salamander. The proliferating epithelium was transplanted intraperitoneally into other salamanders, where growth continued until the cells lost their similarity to lens epithelium and finally came to resemble carcinoma. However, this ether-educed mitosis was inhibited by the following process. Other salamander lenses were rubbed with ether, which was then allowed to evaporate. The residue from the lenses was resuspended in saline and injected into the eyes of salamanders that had been injected with a 4-percent-ether solution 8 days previously. Subsequently, few or no mitotic divisions were observed. From this Reinke concluded that a material which inhibits mitotic division is present in tissue and is extractable with ether. The continued action of ether upon normal cells dissolves or alters this substance in a way which permits the occurrence of atypical growth. However, if this material is supplied again, it apparently can be reabsorbed into the cells, where it exerts its inhibiting action upon growth.

Stimulated by these experiments, Askanazy (*3*) mixed rat embryo emulsion with 4-percent ether before inoculation into rats and obtained a series of large, rapidly growing teratoid tumors unlike any he had ever observed after inoculation of untreated embryos.

It would seem that the ether-soluble substance described by Reinke may be similar to or the same as retine, as described by Szent-Györgi *et al.*

MILTON B. YATVIN
University Hospitals,
1300 University Avenue,
Madison 6, Wisconsin

References

1. Reinke, *Deut. Medizenalzeitung* **28**, 579 (1907); *Muench. Med. Wochschr.* **54**, 2381 (1907).
2. W. H. Woglom, *The Study of Experimental Cancer: A Review* (Columbia Univ. Press, New York, 1913).
3. Askanazy, *Wien. Med. Wochschr.* **59**, 2518, 2578 (1909); *Zentr. Allgem. Pathol. Anat.* **20**, 1039 (1909).

Majority Opinion: Right or Wrong?

In a democracy so much emphasis is given to the majority opinion that it is generally assumed that the majority is right. "Fifty million Frenchmen can't be wrong." I would like to raise the question as to whether or not the opinion of the majority is almost always wrong.

History abounds with examples of popular opinion later proved to be incorrect and absurd. The Crusades of the Middle Ages are typical—especially the Children's Crusade in which thousands of young children were sacrificed for no purpose. The search for the Holy Grail and the Fountain of Youth involved large groups of so-called intellectuals. A mania for dancing in the streets was almost universal at one period of European history. The inquisition and witch burning have been popular enterprises. Wars in general have proved totally ineffective and unnecessary. Nothing was sillier than our own destructive Civil War which could have been averted if the opinion of a small minority had been given consideration. In more recent times the German slaughter of the Jews and our own experience with prohibition have furnished plenty of evidence that majority opinion has been found wrong after temporary emotions have subsided.

All this leads me to wonder if we are not engaged in another misdirected effort for man-in-space navigation. Unquestionably, the expenditure of hundreds of billions of dollars for these projects has the majority support of the public and Congress. In attempting to push these vast engineering projects by a crash program, we are neglecting fundamental scientific work on properties of material and its environ and the determination of basic constants and knowledge that would lead to a more effective solution of the major enterprises if later they were still considered to be worth our effort. In fact what few real accomplishments have been made along basic research are suppressed if they tend to minimize the development of man-operated rocket ships. For example, there is plenty of spectroscopic evidence published by Kiess and colleagues that the atmosphere of Mars consists primarily of the oxides of nitrogen, yet propaganda is prevalent for a hundred billion dollar space landing in order to study the assumed vegetation and life which present evidence proves cannot exist. I believe these vast sums could be better spent in other ways, with just a few thousand dollars for spectroscopic work on planetary atmospheres by spectroscopists rather than publicity seekers. The future will undoubtedly disclose that the present majority opinion and enthusiasm for plunging into these costly space efforts were ill-advised, both from the scientific and from the political standpoint.

PAUL D. FOOTE
National Academy of Sciences–
National Research Council,
Washington 25, D.C.

Clipping and Conflict

Each week *Science* places in conflict those of its readers who clip out articles and reports of particular interest in order to file them by topic. In the 30 August issue, for example, there were seven articles on behavior and behavioral mechanisms which were massed together on pages 820 to 831. It is impossible to separate all seven of these articles without mutilating many of them, and one is forced to decide which relevant articles to mutilate and which to save, even though he may want to save them all.

Readers would not have to face this conflict if articles and reports on closely related topics were not placed next to each other—that is, if reports on physical and chemical problems were alternated with reports on biological and behavioral problems. The two reports in that issue on the West Ford dipole belt might well have been left together, followed by one of the be-