

## More favor for applied science

Science policy in the United States Government has generally been an ad hoc affair. Individual projects were debated and decided on their own merits without any serious attempt to fit them into an over-all strategy of scientific advance.

As long as levels of financial support were high, no one worried. In the post-Sputnik era science was golden, and the rain of money fell on the just and the unjust alike. Questions of priority were set aside and a national commitment to the support of science was tacitly assumed.

Then support fell, and the wailing and gnashing of teeth commenced. Questions of the relative priority to be assigned different branches of science, of the proper relationship between basic and applied sciences and of the existence and size of a national commitment, began to be debated. Scientists began to say that an explicit policy, a long-term plan to let them know where they stood, ought to be presented.

The Nixon Administration has a liking for grand strategies, game plans and sweeping reorganizations. It appears that it is now about to impose one on the scientific establishment.

**Dr. Edward E. David**, the President's new science adviser (SN: 8/29, p. 158), told the staff and guests of the National Bureau of Standards last week that national science policies are being worked out and will be presented to the President some time in the near future. He discussed some of the ideas that are going into the discussions and what he called "my prejudices" in approaching the questions involved.

One of the most important things that Dr. David made clear is that there will be less manna to be picked up. For the decade of the 1970's, he predicts (even though eight years of the decade lie beyond the election of 1972) that there will be no more blank checks. The days of the 15 percent growth rate that many considered standard are over.

He reminds the scientists that they are no longer the heroes of the people. People have seen much evil come from the discoveries of science and are beginning to wonder whether those in charge of science are responsible people (SN: 1/2, p. 5).

The emphasis of future policies seems definitely to favor applied science. Dr. David repeatedly mentions new products and services and the needs of society. His peroration:

"The opportunity for both excellent research and new products and services in response to the needs of society ought to be the driving force in setting science policy."



NBS

David: *Emphasis on society's needs.*

Among the needs of society that Dr. David finds most important are health care, power production and remedies to environmental pollution. He mentions a program to make adequate health care available to the whole population. This will require a great increase in the quantity of health care, and he says, "We must have the technological capability to increase the supply."

This will require a research and development effort, not only in disease prevention and cure but in logistical questions such as whether hospitals and computers really go together.

Dr. David sees research and development as an input-output system in which people and ideas go in and products and services come out. He feels that Government ought to pay more attention to the output side than it has done.

Especially he feels that the Government ought to do more for what he calls demonstrations or pilot projects. That means the translation of a technological development into a marketable industrial process. The Government, he feels, should do more funding of such demonstrations either wholly or in cooperation with industry.

**Governmental support** of basic research, he says, should be on a level-of-effort basis, as is done by a number of industrial organizations. Some people have suggested that a particular proportion of gross national product be set aside for basic research. Dr. David believes that this approach is too rigid, though he does not say by what other formula he would calculate his level of effort. He does say that the basic research that is done should be justified by its quality as judged by knowledgeable people and by a comparison with work being done elsewhere in the world.

Scientific education is in trouble because the sudden cuts in support have resulted in wide-spread unemployment

and bleak prospects for graduates. As an example of the sort of thinking going on, he remarks that some people have suggested doing away with Government traineeships and allowing the number of Ph.D.'s produced to fall to the level determined by the needs of the market. Dr. David does not endorse this, but he says some changes will be necessary. He counsels caution in making changes since, he says, anything done today will affect conditions six years hence and no one can be sure what they will be.

**The organization** of Federal science is another policy topic that keeps cropping up. From what Dr. David says about this, the oft-repeated suggestion of a Department of Science apparently finds no more support among the present Administration than it did in previous ones.

Another approach is the suggestion of the House Committee on Science and Astronautics to create a body called the National Institutes of Research and Advanced Study, which would gather under one organization-chart box about 50 percent of all Government science.

Dr. David mentions that this is under discussion and cites arguments pro and con without saying whether he favors it. He does say, however, that mission-oriented agencies such as the Defense Department should be allowed to do much of their own research, thus disagreeing with the Senate, which has exhibited a tendency to try to limit research by mission agencies. □

## ARTHRITIS TREATMENT

### Two more possibilities

An estimated 17 million persons of all ages in the United States suffer from the pains of arthritis. As most of them know well, the cause of this disease which, like cancer, is actually a host of related disorders rather than a single disease entity, remains elusive. Its treatment, variable in nature, is equally variable in effectiveness.

There are theories of its etiology, backed by circumstantial evidence, not proof. That with the widest currency at present holds that arthritis is an autoimmune disease in which the body reacts against itself, and suggests that viruses may play a role in triggering this reaction. Treatment for the pain of arthritis, an inflammation of the joints, ranges from aspirin, which is often effective, particularly in early stages, to use of the steroid cortisone to administration of gold salts. None is uniformly effective and serious side effects are associated with cortisone and gold.

Last week, at a meeting in Washington of the Arthritis Foundation, scientists elaborated on current theories of

etiology and modes of treatment. Among the newer concepts presented was a suggestion that prostaglandins, widely billed as the wonder drugs of the 1970's (SN: 10/10, p. 306), may prove valuable in treating arthritis and a plea that investigators pursue the possibility that the amino acid histidine could become a useful addition to the list of anti-arthritic agents.

Drs. Robert B. Zurier and Gerald Weissmann of the New York University School of Medicine reported that in laboratory experiments they find that prostaglandin  $E_1$  stabilizes the membranes of lysosomes, inhibiting the leakage of enzymes from these intracellular organelles. Previous work has indicated that when lysosomal enzymes escape from lysosomes, they can destroy cartilage and lead to joint destruction.

"Prostaglandin  $E_1$ ," Dr. Zurier observes, "inhibits this leakage, just as steroids do, but it may conceivably be a more effective treatment because it is presumably less toxic." At the same time, he and Dr. Weissmann stressed that their studies so far have involved only cell cultures in the laboratory and that a host of animal and human tests will have to be performed before anyone can validly speculate on the potential therapeutic role of prostaglandins in treating rheumatoid arthritis or other inflammatory diseases.

In another presentation, Dr. Donald A. Gerber of Downstate Medical Center in Brooklyn reported data to support his view that arthritis may be a disease involving a metabolic disorder that can be at least partially relieved by administering histidine to patients.

Histidine, he notes, is the only amino acid found routinely in very low amounts in the serum of individuals with rheumatoid arthritis. During the last three years, Dr. Gerber has conducted clinical trials with 66 persons with advanced rheumatoid arthritis. He administered approximately three grams of histidine daily in capsule form. In all but two of those 66 patients he observed clear improvement, sometimes lasting several months before retreatment was necessary.

Speculating on the mechanism involved, Dr. Gerber explains that histidine, like gold salts, inhibits the denaturation of gamma globulin, an immune globulin considered to be a stimulus to the formation of rheumatoid factor in joint fluid. Thus, he hypothesizes, if histidine levels can be maintained at a sufficiently high concentration to block the breakdown of gamma globulin and its sequelae, arthritis may be controlled. No adverse side effects from histidine have been observed in his studies. But he says he would like to see them repeated by other "less biased" research scientists. □

## The other extreme



*Dr. Tarling's reconstruction of Gondwanaland: One extreme in the range of possible assemblages.*

D. H. Tarling/NATURE

Few scientists now deny that the continents were once joined together in a single giant landmass. The question that occupies them now is how they fit together. Continental reconstructions are generally based on geographical fits and other evidence, such as matching geological features. But the data are incomplete and contradictory, and the issue is far from being settled.

Last year, for instance, two British scientists, Drs. A. Gilbert Smith and Anthony Hallam, published a computer fit of the 500-fathom contour of the southern continents, along with supporting geological evidence (SN: 2/28/70, p. 229).

Now Dr. D. H. Tarling of the University of Newcastle upon Tyne in England, using similar techniques but somewhat different criteria, has arrived at a very different fit. Drs. Smith and Hallam had placed both India and Australia against Antarctica, with the Antarctic Peninsula extending into the gap between the southern tips of Africa and South America. Madagascar and Ceylon were fit into the gap between India and Africa, with Madagascar somewhat north of its present position. In the Jan. 1 NATURE Dr. Tarling rotates Antarctica counterclockwise, so that Australia is closer to India and Africa, and Madagascar is in its present location. Continental edges were placed at the 1,000-fathom contour.

**The two reconstructions** can best be tested, Dr. Tarling believes, by determining if Madagascar has indeed moved southward.

Though Drs. Smith and Hallam had shown geological evidence for a northern position of Madagascar, all geological studies in the parts of east Africa and Madagascar bordering the Mozambique Channel, Dr. Tarling points out, show that the channel has

been subsiding for the past 300 million years. This, and evidence from elsewhere in the Indian Ocean, leads Dr. Tarling to conclude that the channel was not created by sea-floor spreading during the past 300 million years, and that Madagascar could not have fit into that region during the Mesozoic era, as required by the Smith-Hallam reconstruction.

**For the northern continents**, Dr. Tarling suggests a slight modification of the generally accepted model proposed by Sir Edward Bullard, moving Europe and Greenland slightly northward relative to North America. This eliminates an overlap between Spain and Morocco and turns the area between northwestern Greenland and Ellesmere Island into a simple transcurrent fault, rather than a compression zone.

In general, the paleomagnetic data, says Dr. Tarling, tend to favor his reconstruction for the Mesozoic and early Tertiary (230 million to 60 million years ago), but are slightly more in agreement with the Smith and Hallam reconstruction for the Paleozoic (600 million to 230 million years ago).

Dr. Tarling also describes how the continental distribution has evolved into its present pattern from his reconstruction.

The Smith and Hallam reconstruction, he concludes, cannot be considered unique from morphological consideration alone, and other fits of Africa, India, Australia and Antarctica are possible.

"The most likely fit for a period some 300 million years ago," he says, "must be tested rigorously using other criteria. Neither of these reconstructions can be considered as the final picture for the period 250 million-300 million years ago, but they seem to represent the two extremes of the possible assemblages." □