News of Science

Impure Biochemical Products

Many biochemists have expressed concern about the quality of commercial biochemical products, feeling that investigators were unsuspectingly using materials of dubious quality. The governing bodies of the Division of Biological Chemistry of the American Chemical Society and the American Society of Biological Chemists recommended at their spring 1955 meetings that the problem of quality of biochemicals be referred to the Committee on Biological Chemistry, Division of Chemistry and Chemical Technology of the National Research Council. In May of that year, this committee sent questionnaires to all members of the two afore-mentioned biochemical groups in order to obtain opinions and guidance with respect to the magnitude of the problem. Approximately 2200 questionnaires were mailed out and 922 were returned.

On the basis of the large percentage of replies and the nature of the answers and the additional comments, it was clear that there was widespread interest in the present status of commercial biochemicals. Of those replying, 90 percent felt there is a serious need for attempting to improve the quality of biochemicals. A large majority indicated that an NRC committee "representative of academic research and industry" should have responsibility for making efforts toward the betterment of the situation. The same percentage felt that a broad program should be organized for the establishment of minimum specifications of commercially produced biochemicals.

In addition to the routine answers, more than 120 respondents made comments, almost all of which recommended positive action. Many described specific instances wherein faulty commercial biochemicals resulted in serious research difficulties. However, nearly all of the complaints were directed against two firms. Many suggested that, in lieu of reference standards and/or specifications, manufacturers might supply a better description of their products, including information about sources, purification procedures, chemical analyses, and impurities.

The questionnaire also requested suggestions concerning specific biochemicals for which there was need for minimum specifications and/or reference substances. Categories of biochemicals that were named more than 100 times are listed in Table 1.

Table 1. Categories of biochemicals for which there is need for minimum specifications and/or reference substances. The numbers indicate how many times each category was named in answers to the questionnaire.

Category	Specifications only	Reference substances
Nucleic acid	334	251
Amino acids and peptides	243	191
Coenzymes	143	69
Enzymes	173	68
Lipids	136	126
Carbohydrates	125	146

The committee regarded the response to the questionnaire as a mandate for action. It was generally agreed that the best solution to the problem would be the establishment of minimum standard specifications for biochemicals, possibly supplemented with reference substances. However, after a survey of the experience of the American Chemical Society in the establishment of standards for inorganic chemicals, and the experience of the U.S. Pharmacopeia and the National Formulary in similar tasks, it was obvious that such an undertaking would be of very great magnitude and would require such a long time that it would provide little benefit for the near future.

As a first step, it was decided to draw up description sheets for biochemicals and to distribute these in such form that biochemists could obtain them at a nominal cost. These description sheets will cover physical constants, methods of preparation, methods of purification and assay, likely impurities and their methods of determination, information concerning stability and storage conditions, and a list of suppliers.

It was decided to assign the task of drawing up these description sheets to various subcommittees representing specialized areas of biochemistry that would work in close collaboration with the biochemical producers. Because the questionnaire revealed the greatest need for information on nucleic acids, amino acids, and nucleotide coenzymes, committees covering these fields were set up first with George B. Brown, Jesse P. Greenstein, and Nathan O. Kaplan as the respective chairmen. As experience is gained in their work, it is anticipated that subcommittees will be set up later for enzymes, lipids, carbohydrates, and other fields.

This program is being financed partly by a grant from the National Institutes of Health and partly by a Rockefeller Public Service award. Further suggestions will be welcomed by the committee. Address: Committee on Biological Chemistry, Division of Chemistry and Chemical Technology, National Research Council, 2101 Constitution Ave., Washington 25, D.C.

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AAAS Newcomb Cleveland Prize

Seymour S. Cohen, professor of biochemistry at the University of Pennsylvania, received the AAAS Newcomb Cleveland prize on 30 Dec. during the association's annual meeting in Atlanta, Ga. Collaborators in parts of the research for which Cohen was honored were G. R. Wyatt and T. T. Weed, now of Yale University.

The award address was entitled "Molecular bases of the parasitism of some bacterial viruses." An extreme parasitism occurs in the infection of *Escherichia coli* by the T2, T4, or T6 bacteriophages. These viruses prevent bacterial growth and division, eventually lysing the cells.

Cohen has shown that these viruses inhibit the synthesis of bacterial nucleoprotein and enzymes. Cell synthesis is directed almost exclusively to the production of virus desoxyribonucleic acid (DNA) and virus protein. Virus DNA contains a new pyrimidine base, 5-hydroxymethyl cytosine (HMC), in contrast to host nucleic acids which contain cystosine. Virus infection compels the conversion of cytosine to HMC, making the former unavailable for the synthesis of cell nucleic acids and shifting nucleic acid synthesis to that characteristic of virus—that is, DNA containing HMC.

Cohen has demonstrated that hydroxymethylation is an irreversible trap for cytosine. Once formed, HMC and HMC desoxyriboside are practically inert to bacterial enzymes which degrade cyto-

sine and derivatives. Furthermore, the presence of HMC in virus DNA stabilizes this polymer to depolymerases and phosphatases. This is owing to the addition of glucose to the hydroxymethyl group, which then inhibits cleavage of phosphate esters of HMC desoxyriboside. Thus the formation of HMC not only serves to switch host metabolism to virus production, but associated structures assist the survival of viral DNA in the host.

North Pacific Survey

In July, August, and September 1955 nearly 20 agencies from Japan, Canada, and the United States combined their facilities to make a great synoptic oceanographic survey (called NORPAC) of the North Pacific Ocean [*Science* **121**, 794 (1955)]. Such coverage has long been needed to provide background knowledge of hydrography for studies of fisheries problems. Approximately 20 large vessels and many small ones participated in the program.

The enormous gyral of the Pacific Ocean had been studied before in piecemeal style, but the independent efforts were either made on too small a scale or else were made over too long a period of time for their results to be used effectively in determining the currents and transport of water. Contiguous cruises made by the Pacific Oceanographic Group in Canada and the California Cooperative Oceanic Fisheries Investigations in August 1950, and jointly by the latter and the Pacific Oceanic Fishery Investigations of the U.S. Fish and Wildlife Service in Hawaii in January 1954, had confirmed the belief that great advantages were gained by studying large oceanic areas in short periods of time because a survey of short duration would avoid inclusion of seasonal changes in ocean currents in the measurements.

The proposal for a large-scale, short-duration oceanographic survey of the North Pacific Ocean was made at the fifth Pacific Tuna Conference in November 1954, which was attended by all the agencies that subsequently took part in the cruise except for those from Japan, and it was immediately decided to try to make such a survey. Various Japanese scientists were asked whether or not the Japanese would participate, and they answered through K. Suda of the Japanese Hydrographic Office, at once agreeing to take part.

At intervals of from 20 to 200 miles, water sampling bottles and thermometers were lowered from the surface to depths varying from 1200 to 6000 meters. Water samples were drawn and immediately measured for dissolved oxygen content and inorganic phosphate and, in some cases, for silicate. Additional samples were drawn for later measurement ashore of salinity, deuterium, and level of radioactivity.

Some vessels carried sonic apparatus so that the depth of the ocean could be continuously recorded. Transparency was measured by lowering secchi disks on all daylight stations. Using towed geomagnetic electrokinetographs, eight of the survey vessels recorded surface currents. At intervals between hydrographic casts, temperature-and-depth data were obtained by lowering bathythermographs.

The biological program consisted of several parts. Net hauls of zooplankton and phytoplankton were taken from various depths down to 1000 meters; small creatures such as saury, squid, sunfish, and others were observed and netted at night while the vessel was not under way; many vessels trolled; and daylight observations of birds, fish, and mammals were made and recorded. It is anticipated that the results of this survey will be immediately useful to two new pelagic fishery investigations in the North Pacific. These are the offshore salmon investigations being conducted by Japan and the United States under the auspices of the North Pacific Fishery Treaty and the offshore albacore studies that are being carried out by the Pacific Oceanic Fishery Investigations in Hawaii and the fishery agencies of California, Oregon, and Washington. These investigations have already discovered large offshore concentrations of salmon and albacore. The ecological basis for the summer distribution of these populations should be revealed by analysis of the observations made during NORPAC.

In area covered, number of stations occupied, number of observations made, and in samples collected, this is the largest oceanographic survey ever carried out in such a short period (most of the data were taken in August, although a few ships began in July and did not return until mid-September). Processing of the hydrographic data has begun, and it is expected that the preliminary results of the observations will be available in March 1956.

African Honey-Guides

A long-term study of the behavior of honey-guides, African birds distantly related to the American woodpecker, is described by Herbert Friedmann, curator of birds at the U.S. National Museum, in a bulletin just issued by the Smithsonian Institution. The birds guide men, baboons, and ratels (honey badgers) to the nests of wild honeybees.

Friedmann has observed at least 23 instances of the guiding habit and has collected much other well-authenticated data from African associates. Friedmann describes the behavior, which he says is purely instinctive, as follows:

"When the bird is ready to begin guiding, it either comes to a person and starts a repetitive series of churring notes or it stays where it is and begins calling. . . . These churring notes are very similar to the sound made by shaking a partly full, small matchbox rapidly sidewise. . . .

"As the person comes to within 15 or 20 feet, . . . the bird flies off with an initial conspicuous downward dip, and then goes off to another tree, not necessarily in sight of the follower, in fact more often out of sight than not. Then it waits there, churring loudly until the follower again nears it, when the action is repeated. This goes on until the vicinity of the bee's nest is reached. Here the bird suddenly ceases calling and perches quietly in a tree nearby. It waits there for the follower to open the hive, and it usually remains there until the person has departed with his loot of honeycomb, when it comes down to the plundered bees' nest and begins to feed on the bits of comb left strewn about. The time during which the bird may wait quietly may vary from a few minutes to well over an hour and a half."

The bird appears to have a peculiar ability to digest wax. Friedmann, with various collaborators, is now carrying out a study of the mechanism of wax digestion.

Australopithecines

Chiefly on the basis of the three hipbones thus far discovered, it has been widely assumed that the early Pleistocene primates of South Africa, the Australopithecines, were fully erect terrestrial bipeds that walked essentially like man. Using the split-line technique, Lois W. Mednick has recently compared the hipbones of modern man and chimpanzee and has applied the results of her study in an analysis of the Australopithecine pelvis [*Am. J. Phys. Anthropol.* **13**, 203 (June 1955)].

The iliac tubercle and associated pillar of bone are well developed in man but lacking in the chimpanzee. These structures, which are regarded as of prime importance in maintaining an erect, bipedal posture, are but poorly developed in the Australopithecines. The findings suggest that the Australopithecines could not balance themselves as well as man and were still in the process of adapting to erect progression.

Mednick thinks that these animals may represent a transitional stage of bipedal adaptation that never reached its culmination; on the other hand, she thinks it is also possible that they may represent a stage that developed into man. It may