counter the greatest difficulty in crossing large water barriers. Extension of their range depends on a precarious means of dispersal, and to survive in a new area they require acceptable hosts. The species of the genus *Paracimex* (family Cimicidae, bedbugs) are associated only with swifts of the genera *Chaetura* and *Collocalia*. Only the spine-tailed swifts of the genus *Chaetura* and the *esculenta* group of species of *Collocalia* are known to host *Paracimex*. Extensions of range are presumably accomplished through chance transport, on a host, of a gravid female bug. Accordingly, the distribution patterns of *Paracimex* are complex (N. Ueshima, University of California, Berkeley).

The present-day insect fauna of the Japanese archipelago apparently resulted from several centrifugal waves of dispersal from the adjacent continental area, influenced by certain classical water barriers. North of Watase's Line, between Yaqu Island and Amami-Oshima, the fauna is essentially Palearctic, whereas to the south they are Oriental. Blakiston's Line, in the Tsugaru Strait, which divides the Euro-Siberian and Manchurian subregions, was a less effective barrier to dispersal of insects than to mammals and birds. The fauna is also influenced by dispersal that occurred before water barriers existed there. The fauna of the Ryukyu Islands is particularly interesting since dispersal of insects of continental origin can be traced by three separate routes: the first from southwest to northeast via Taiwan, the second from north to southwest via Kyushu, and the third directly from continental China prior to separation of the islands from the Asiatic mainland (T. Ishihara, Ehime University, and K. Yasumatsu, Kyushu University).

The role of the Bering Strait area, Beringia, in the exchange of insects between the land masses of Eurasia and North America is evident from a comparison of their faunas, which are so similar that they are commonly treated together as the Holarctic fauna. An analysis of the Diptera (true flies) of the Nearctic and Palearctic regions supports the idea that a considerable exchange of species took place, probably during Wisconsin time, when there was a temperate flora and fauna in Beringia. Similar evidence is available in the semiaquatic bugs of the family Saldidae, which feed on other small organisms, usually insects. The leafhopper fauna of northwestern North America contains some elements that appear to be relicts of groups now best represented (in terms of numbers of species) in the Palearctic region; a continuous range for the ancestors of these forms is presumed during the time the climate of Beringia was temperate (R. I. Sailer, U.S. Department of Agriculture, and John D. Lattin and Paul Oman, Oregon State University).

The seminar participants recommended the following: (i) an intensive study of the insects in the land areas bordering the northern Pacific area, including the Bonin islands, through joint field expeditions and cooperative taxonomic studies by Japanese and American scientists, and (ii) development and implementation of methods to extend knowledge of the long-distance aerial movement of insects over water and of the factors responsible for such movements. It was also recommended that there be a follow-up conference during the fall of 1969 or the spring of 1970, with the preferred meeting site being Fukuoka, Japan. Organizers for the seminar were: for Japan, K. Yasumatsu; for the United States, P. Oman and K. V. Krombein.

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Photorespiration

Experimental problems and interpretations of the phenomenon of photorespiration were discussed at a conference held at Case Western Reserve University, Cleveland, Ohio, 5–8 February 1968. Representatives were invited from several major laboratories around the world now investigating this problem. Major areas under discussion included the techniques of gas analysis and the measurement of photosynthesis and photorespiration; the problem of nonmetabolic carbon dioxide exchange in leaves; photorespiration: its substrates, its relation to photosynthesis and dark respiration, its response to changes in external factors; and taxonomy, genetics, and productivity.

It was concluded that techniques now used to measure carbon dioxide exchange in leaves have major limitations because they cannot account for the internal cycling of carbon dioxide. Rates of photorespiration may approach the rate of apparent or net photosynthesis; true photosynthesis or gross carbon dioxide uptake must be correspondingly higher. If it were possible to selectively inhibit photorespiration, the productivity of crop plants might be nearly doubled. Work done with oxygen isotopes, and the analysis of experiments involving competition between oxygen and carbon dioxide, suggests that in plants having a positive carbon dioxide compensation point there is competition between oxygen and carbon dioxide for light-generated reducing power. In plants having zero compensation no such competition is evident, suggesting that the reducing system in these plants is insensitive to or protected from oxygen.

The general conclusion that glycolate is a major substrate for photorespiration has been well supported, and there is sufficient glycolic acid oxidase in leaves to account for even the highest estimated rates of photorespiration. The pathways for the genesis of glycolic acid are still obscure, however. Some experiments support the earlier idea that it is derived from ribulose diphosphate or other pools of intermediates in the carbon dioxide fixation cycle.

There is a clear distinction between the processes of light and dark respiration, based on their differential sensitivity to oxygen, temperature, inhibitors, and on the specific activity of substrates used for respiration after the supply of $^{14}CO_2$. Considerable evidence supports the idea that photorespiration is closely related to photosynthesis in a mechanistic way. Conditions which affect photosynthesis equally affect photorespiration; the development pattern of photorespiration closely follows that of photosynthesis. The substrate pools for photorespiration are small, rapidly turned over (with a half-life of seconds or a few minutes), and are derived from recent photosynthate. At low carbon dioxide levels, some carbon from sources distant from photosynthesis is also used in photorespiration.

There is a clear relation between the phenomenon of zero carbon dioxide compensation and leaf anatomy. Groups of zero-compensation plants have been taxonomically distinguished on the basis of anatomical vegetative characteristics. There is no relation, however, to the major taxa; zero compensation is probably a recent development which has arisen in tropical members of several major groups. Analysis of the productivity of mutants has shown that the

genetic basis for photosynthetic capacity involves relatively few genes at the rate-determining step.

The conference provided a forum for the testing, exchange, and development of ideas, and for the organization of a number of cooperative projects in this rapidly expanding field.

R. G. S. BIDWELL
Case Western Reserve University, Cleveland, Ohio 44106

Calendar of Events

Courses

Computer Methods of Network Analysis, Los Angeles, Calif., 20 July–2 August. Is intended for engineers, physicists, and applied mathematicians using digital computers to solve network problems arising in electrotechnology and other physical fields which can be represented by network analogies. (P.O. Box 24902, Engineering and Physical Sciences Extension, University of California Extension, Los Angeles 90024)

Fluid Control Systems, Stillwater, Okla., 22 July–2 August. The course will summarize the basic techniques underlying the analysis and design of fluid power control and fluidic systems. During the first week emphasis will be on fundamental concepts, including static and dynamic modeling of components and systems, computer-aided analysis and design, contamination control, and fluid logic systems analysis. The second week will be devoted to recent developments and current research activities with emphasis on advanced systems for hostile environments. Fee: $250. (Director, Engineering and Industrial Extension, Oklahoma State University, Stillwater 74074)

Laboratory Training Courses, Atlanta, Ga., July 1968–June 1969. These courses are being given at the National Communicable Disease Center and will begin in September. Most of the courses are for 1 or 2 weeks, and the deadline for applications is approximately 6 weeks before classes are scheduled. Some of the course subjects are: human blood morphology, laboratory methods in respirovirology, isolation of *Salmonellae* from food products and animal feeds, medical mycology, laboratory diagnosis by serologic methods, and laboratory methods in enteric bacteriology. (Training Office, Laboratory Program, National Communicable Disease Center, Atlanta 30333)

Thin Film Technology and Devices, Austin, Texas, 15–19 July. This course will survey the most prominent thin-film technologies, including advantages, disadvantages, and methodologies to assist the engineer, scientist, and administrator in selecting those techniques most useful to the solution of his technical problems. Participants will gain a basic understanding of the more important thin-film techniques. Fee: $175. (Engineering Institutes, College of Engineering, c/o Division of Extension, University of Texas at Austin, Austin 78712)

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Biochemistry Ph.D.; M.S. physiological chemistry, nutrition minor; research fermentation, flavor, nutrition; prefers food, drug research appointment. Woodward Personnel Bureau, 185 North Wabash, Chicago 60601. X

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Developmental Biologist, Ph.D. Experience in tissue culture, immunology, electron microscopy. Desires medical research with opportunity for independent investigation. Box 257, SCIENCE. 7/12, 19

Biophysicist, Bachelor's degree in engineering-physics, 10 years' industrial R&D experience, will receive Ph.D. in Biophysics June 1968. Desires research job in molecular biophysics. Box 246, SCIENCE. 7/12

Botanist Ph.D. Research/teaching experience. Lecturer, Canadian University. Taught general biology, genetics, plant taxonomy, ecology, anatomy, cryptogamic. Desires college/university teaching. VARMA, 153 Regent, Fredericton (Canada). X

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Marine-Cytologist. Electron microscopist. M.S. teaching and research experience. Ph.D. near completion. Seeking teaching/research position for September. Box 252, SCIENCE. X

Microbiologist/Radiation Biologist, expecting Ph.D. in August from major eastern university. Wishes to teach undergraduate. Six years' teaching experience. Box 259, SCIENCE. X

Physiologist, Ph.D. Fourteen years' experience in undergraduate and professional schools. Publications. Desires academic position, September 1968. Box 260, SCIENCE. X

Research Assistant, M.S. Experience and graduate course work in developmental biology, genetics, biochemistry and radioisotopes. University or university-affiliated position preferred. Box 253, SCIENCE. X

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