

A Report on the World Solar Energy Conference— The Scientific Basis, October 31-November 1, 1955

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This meeting at Tucson, Arizona concentrated on the scientific approaches to solar energy, and it was followed by a symposium on applied solar energy at Phoenix. The phenomenally well-planned program consisted of papers prepared by advance-guard investigators in many special fields, and participation had been secured from a broad spectrum of nations, including the Soviet Union.

Two observations impressed the reporter. The solar energy field is an effective integration area of many special groups, both of scientists and of nations. Also, as the field is developing, there is a constant interplay between pure and applied approaches: attending the conference were such diverse persons as solar astronomers, plant systematists, a toy manufacturer, and an herb doctor.

Quite properly, the conference began with the general consideration of just what is being addressed under the term "solar energy". Thomas (1) brought out the characteristics of the sun itself which are responsible for the radiation which the earth receives in rather constant amount. It has been computed at 1.98 cal. per cm^2 per min, and similar figures. Hence the actual amount received at the surface is related to atmospheric conditions, and about 46% comes through, according to Fritz (2). Considerable ingenuity has been exhibited in the utilization of that energy. Daniels (3) had compiled sizeable lists of apparatus and methods, and he suggested a practical unit of measurement, 1,000,000 cal. per min., or the amount striking 100 m^2 . The unit was dubbed the "roof".

The Radiation section of the conference was deeply concerned with the primary problem of measurement. Two papers discussed different continuous recording apparatus. Others brought out features of radiation measurement applicable to special cases. It was concluded that South African sunshine could heat dwellings in winter, and that the fading of paint could be related to the amount of ultra violet radiation.

Practical applications were most conspicuous in the solar-thermal field. The conferees were invited to inspect a house air conditioned by a sun powered thermal-water system. Many were astonished to find over thirty brands of solar water heaters available for sale. Solar stoves intrigued the representatives of fuel-poor countries.

The short conference was organized into concurrent sessions concerned with the thermal, photo-electric, and photo-chemical approaches to understanding and utilizing solar energy. Consequently, attention had to be largely restricted to one of these.

The photo-chemical sessions devoted most of their attention to algae. The efficiency of algae in comparison with higher crop plants was examined, but there were also several applications of algae cultivation in which efficiency is not a present concern—sewage treatment, and the production of proteins, vitamins, and other biologicals. Growth technique—involving day length, vat construction, control of light intensity, nutrient replenishment—was discussed in a variety of papers.

However, it was apparent that major advancements in the utilization of photochemical energy depend on the findings in bio-chemistry and bio-physics—energy transfer within the chloroplast, the photogalvanic effect, the relation between energy levels and reaction speeds. It was particularly evident that here is a promising field where the approaches of many special interests can find common cause.

- (1) Thomas, Richard N. (Harvard) The Features of the Solar Spectrum as Imposed by the Physics of the Sun.
- (2) Fritz, Sigmund (U. S. Weather Bureau) Transmission of Solar Energy Through the Earth's Clear and Cloudy Atmosphere.
- (3) Daniels, Farrington (Wisconsin) Principals and Problems in the Utilization of Solar Energy.