unit of light emission and the relation between the flash and the fine structure of the organ. Hagins, Hanson, and Buck noted that the steady glows of firefly organs and of luminous bacteria do not involve scintillations lasting less than 0.1 second.

The biochemical fractionation and final purification of essential reactants in luminescence systems is an approach of special interest, inasmuch as only four systems—those of the firefly, *Cypridina*, certain jellyfish (*Aequorea*), and probably luminous bacteria —have been fully purified thus far, and their components are all chemically different from each other. The following data touch on new advances along this line which were reported at the conference.

Kuwabara and Wassink described a purification procedure for the active substance of fungal luminescence (*Omphalia flavida*, now *Mycena citricolor*) which may be provisionally considered fungal luciferin, in a yield of 12 mg of crystalline product from 15 kg of wet mycelium. The absorption, fluorescence, and bioluminescence emission spectra of the substance were reported. Also noted was the ability of this substance to undergo chemiluminescence in absence of enzymes. Cormier and Totter reported a partially purified substance capable of bright phosphorescence in water-free acetone, obtained from the mycelium of the same species.

Isolation of the luciferin from the only known luminous animal completely indigenous to fresh water, namely the New Zealand limpet *Latia neritoides*, was reported by Shimomura, Johnson, and Haneda. This luciferin turned out to be unusual in consisting of an oil readily soluble in *n*-hexane. Its molecular weight by mass spectrometry is 236. Alcoholic solutions are non-fluorescent and colorless, with a single absorption maximum at 212 mμ.

Isolation of the longtime enigmatical system of the luminescent polychaete annelid worm *Chaetopterus* was reported by Shimomura and Johnson. It constituted the second example of a system comprised apparently of only one organic component, a bioluminescent protein, for which the general term "photoprotein" was suggested. The general terms luciferin and luciferase do not apply to such a system, at least in their usual meaning. The first example of a system of this nature was recently found in certain jellyfish (*Aequorea* and *Halistaura*). For luminescence in aqueous solution, the *Chaetopterus* photoprotein specifically requires ferrous iron, a peroxide, and oxygen, whereas the jellyfish photoprotein requires only calcium or strontium.

Partial purification and some properties of the luminescence system of a deep sea shrimp, *Hoplophorous*, was described by Johnson, Stachel, Shimomura, and Haneda. Shimomura, Johnson, and Haneda reported experiments with acetonized and partially ground photogenic organs of the "New Zealand glowworm" (*Arachnocampa luminosa*). The results suggest a biochemical relation, however remote, of this system to that of the firefly, inasmuch as ATP stimulated and pyrophosphate inhibited the light-emitting reaction. The same authors reported some observations on the luminescence system of the exceptionally large New Zealand earthworm (*Octochaetus multiporus*).

The other papers dealt primarily with morphological aspects of photogenic cells, tissues, and organs. Haneda described the luminous organ of the Australian pinecone fish *Cleidopus gloria-maris* and succeeded in obtaining pure cultures of the symbiotic luminous bacteria which provide the source of light in this organ. Through a critical study with the electron microscope of the photogenic organs of squids, Yô K. Okada demonstrated that rod-like contents, which had previously been interpreted as symbiotic bacteria by some authors, were definitely non-bacterial in nature. An extensive investigation, involving electron microscopy as well as conventional cytological and histological methods, provided the basis of an exposition by J.-M. Bassot on photogenic structures in general. Among the many points of interest was the evidence for a "morphological dualism," analogous or corresponding to the "biochemical dualism" of luminescence systems, in the sense that in virtually every example from simplest photocytes to the most complex photophores, there exists at least two different structural components or arrangements to which could be attributed the function of secreting or separating two different, active products, such as a luciferin and a luciferase. Of more than ordinary interest also was the discussion in this paper regarding the evolution of photophores.

The conference was jointly sponsored by the Japan Society for the Promotion of Science and the National Science Foundation. Proceedings of the conference will be published by Princeton University Press in a book entitled *Bioluminescence in Progress*; editors are F. H. Johnson and Y. Haneda.

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Forthcoming Events

September

21–23. **Molecular Motion** in Solids, Liquids, and Gases by Magnetic Resonance, mtg., Canterbury, England. (E. F. W. Seymour, British Radio Spectroscopy Group, School of Physics, Univ. of Warwick, Coventry England)

21–23. **Nuclear and Particle Physics**, conf., Univ. of Glasgow, Glasgow, Scotland. (Meetings Officer, Inst. of Physics and the Physical Soc., 47 Belgrave Sq., London S.W.1, England)

21–23. **Origin and Abundance-Distribution of the Elements**, symp., UNESCO headquarters, Paris, France. (W. D. Page, Div. of Earth Sciences, Natl. Acad. of Sciences 2101 Constitution Ave., Washington, D.C. 20418)

21–23. **Origin and Distribution of the Elements**, symp., Paris, France. (E. Ingerson, Dept. of Geology, Univ. of Texas, Austin 78712)

21–23. **Supermolecular Structure in Fibers**, 25th conf., Fiber Society, Boston, Mass. (L. Rebenfeld, Textile Research Inst., P.O. Box 625, Princeton, N.J.)

21–24. New Methods of **Stellar Dynamics**, colloquium, Besançon, France. (Assistant Secretary, Intern. Astronomical Union, Observatory of Nice, Le Mont-Gros, Nice, France)

21–29. International **Atomic Energy** Agency, 10th general conf., Vienna, Austria. (IAEA, Kärntnerring 11, Vienna 1)

22–24. American College of **Cardiology**, regional mtg. Univ. of Florida, Gainesville. (M. W. Wheat, Jr., Div. of Postgraduate Education, Univ. of Florida College of Medicine, Gainesville 32601)

22–24. **Muscle Circulation**, symp., Smolenice, Czechoslovakia. (O. Hudlická, Inst. of Physiology, Czechoslovak Acad. of Sciences, Budějovická 1083, Prague 4)

23–1. American Soc. of **Clinical Pathologists**, Chicago Ill. (Secretary, 445 North Lake Shore Dr., Chicago 11, Ill.)

24–26. **Phage Genetics and Physiology**, mtg., Naples, Italy. (Organizing Committee, Intern. Laboratory of Genetics and Biophysics, Naples)

25–28. **Gastrointestinal Radiation Injury**, symp., Richland, Wash. (M. F. Sullivan, Biology Dept., Battelle-Northwest, P.O. Box 999, Richland 99352)

25–29. **Water Pollution Control** Federation, 39th mtg., Kansas City, Mo. (R. E. Fuhrman, 4435 Wisconsin Ave., NW, Washington, D.C. 20016)