lished according to the provisions of Section 1 of these rules (hyponym).

Article 6. There may be exceptions to the application of the principles and rules of this code in cases where a rigid application would lead to great confusion. Such exceptions become valid when approved by the Nomenclature Commission.

Nomenclature Commission

A code of nomenclature should secure uniformity, definiteness and stability in the application of names. If proposed rules result in the change of well-established names of economic plants botanists will hesitate to apply them uniformly. All contingencies can not be foreseen and experience has shown that the rigid application of any set of rules results in a few cases of greatly confused nomenclature. The committee has recognized this and hence has introduced an article permitting exceptions. The committee also recognized that to secure uniformity and definiteness the exceptions should in some way be validated. The most convenient and practical validation would be through a permanent judicial body created for the purpose. As the proposed code invites international support, the judicial body should be an international commission. The committee felt that much could be done to pave the way for future international action by appointing a national commission and therefore tentatively submitted a plan for the creation of such a body. This temporary Nomenclature Commission was to consist of nine members, one nominated by the Society of American Bacteriologists, one nominated by the American Phytopathological Society, three elected by the Botanical Society of America, and four elected by the Committee on Nomenclature of the Botanical Society. The details concerning elections and reappointments are here omitted.

The chairman will add that since a subsequent international commission would feel restricted by the decisions of a national body, it might be well to have these decisions take the form of recommendations, the commission meantime perfecting rules and formulating methods of procedure. International rules of nomenclature, including rules for the retroactive fixation of generic types and including a provision for exceptions, together with an International Commission to validate names (generic types and nomina conservanda) would go far toward giving to botany a stable and uniform nomenclature.

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Chairman

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SPECIAL ARTICLES

A FISH, WITH A LUMINOUS ORGAN, DESIGNED FOR THE GROWTH OF LUMINOUS BACTERIA

It has been known for many years that luminous bacteria are abundant in the sea and will grow readily upon dead fish or other marine organisms. It has been reported that at times luminous bacteria may infect living forms, such as sand fleas. A malady is produced, which is finally fatal but which, during its course, causes the animal to luminesce like a true luminous form.[1] Pierantoni[2] has suggested that the light of many luminous organisms is due to symbiotic bacteria living in the cells of the luminous organisms. He claims to have grown the bacteria artificially in the case of certain squid.

While I feel convinced that this is not the case in all luminous animals I have recently had an opportunity[3] of studying two forms which do appear to utilize bacterial light. These are the marine fishes, *Photoplepharon* and *Anomalops,* found in the Banda Islands of the Dutch East Indian Archipelago. They have been known to be luminous since 1897, but the organ was first studied histologically by Steche[4] and found to be made up of a series of columnar gland tubes, a number of which

1 Giard and Billet, *C. R. Soc. Biol.*, I., 593, 1889.

2 Scientia, XXIII., 43, 1918.

3 A study made under the auspices of the Department of Marine Biology, Carnegie Institution of Washington.

4 *Zeit. Wiss. Zool.*, XCII., 349, 1909.

unite to a reservoir which opens to the sea water by a pore. The pores are quite regularly arranged over the outer surface of the organ from which the light emerges.

Despite the general appearance of an organ of external secretion, no luminous material is excreted to the sea water by the living fish. This rather unusual fact has, I believe, its meaning. If the organ is tested in sea water and examined under the microscope, innumerable motile rod-shaped bacteria, sometimes forming spirilla-like chains, can be seen. Smears of the organ, which I obtained in Banda, have been very kindly stained for me by Professor Dahlgren, of Princeton University, and show the bacteria nicely.

In chemical respects an emulsion of the organ behaves just as an emulsion of luminous bacteria and differs in one or another way from extracts of other luminous animals. These various characteristics may be summarized as follows:

1. The light organ is extraordinarily well supplied with blood vessels and the emulsion fully as sensitive to lack of oxygen as are luminous bacteria. Light ceases very quickly in absence of oxygen.

2. If dried, the organ will give only a faint light when again moistened with water. This is characteristic of luminous bacteria. The luminous organs of most other forms can be dried without much loss of photogenic power.

3. Luciferin and luciferase can not be demonstrated.

4. The light is extinguished *without a preliminary flash* by fresh water and other cytolytic (bacteriolytic) agents.

5. Sodium fluoride of 1 to 0.5 per cent. concentration extinguishes readily the light of an emulsion of the gland.

6. Potassium cyanide has an inhibitive effect on light production in about the same concentration as with luminous bacteria.

To these observations must be added the very suggestive fact that the light of *Photoplepharon* and *Anomalops* continues night and day without ceasing and quite independently of stimulation. This is a characteristic of luminous bacteria and fungi alone among organisms, and very strongly suggests that the light is actually due to symbiotic luminous bacteria. The organ becomes, then, an incubator for the growth and nourishment of these forms and we may perhaps look upon the pores mentioned above as a means of exit for dead bacteria. Otherwise their existance would be inexplicable in an organ which certainly does not produce an external secretion.

Actual proof that the bacteria found in the organ are luminous can only come when these are grown artificially. My attempts in this direction have failed. Good growths of bacteria were obtained on pepton-agar but they produced no light. One might expect that a symbiotic form would require rather definite food materials to produce light and it is, perhaps, not surprising that culture experiments have failed. We have Giard and Billet's experience with the form infecting sand fleas. This could be grown artificially but only produced light when infecting the sand fleas themselves. Certainly, the ocular and chemical evidence, if not the cultural evidence, supports the view that the light of these living fish is bacterial in origin. A complete account of the fish will appear shortly in the Carnegie Institution Publications.

E. NEWTON HARVEY

PRINCETON UNIVERSITY,
March 1, 1921

THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

SECTION L—HISTORY OF SCIENCE SESSIONS

THE growing and widespread interest in the history of science, in this country, was very evident during the Convocation Week (December 27–January 1), when two learned national organizations held meetings in Washington, D. C., and Chicago. Each of these organizations held sessions upon the history of science.

During the same week in 1919, The American Historical Association inaugurated the movement by holding at its Cleveland meeting, a most interesting and successful conference.[1] This same asso-

[1] SCIENCE, N. S., Vol. LI., pp. 193–194, February 20, 1920.