

sphere). These last figures depend on the assumed value of  $v$ .

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<sup>1</sup> A summary of the work on recombination is given by Seeliger, "Die Wiedervereinigung von positiven Ionen." *Phys. Zeits.*, 30, 1929.

### Freshwater Biological Research in the Indian Empire.

I HAVE read with deep interest the article by Prof. F. E. Fritsch under the title of "Research in Freshwater Biology and the Functions of a Freshwater Biological Station", published in *NATURE* of Feb. 15 (vol. 125, p. 241). Work in this line is imperative in the Indian Empire. Algological research in the Indian Empire is still in its infancy. Investigation into the algal flora of this country is not only valuable for its purely scientific interest but also from a practical point of view, as hinted in Prof. Fritsch's article. So far as my experience goes, this land is very rich in algal vegetation. From a few bottles of algæ collected from the Loktak Lake, Manipur, Assam, by the late Dr. N. Annandale, Dr. Brühl<sup>1</sup> and I have discovered as many as forty-three new species of algæ. Most of them were found from a small bottle. In my recent work<sup>2</sup> on freshwater algæ of Malayan waters, I have described four species and five new varieties which appear new to science. Previous works on the algal flora of this country such as those of Turner,<sup>3</sup> West,<sup>4</sup> and N. Carter<sup>5</sup> also confirm the prospect of a similar finding of interesting new plants and forms peculiar to the Indian soil and climate.

Not much work from the point of view of periodicity, quantitative analysis or ecological study has yet been done here except Fritsch's important publication on "A General Consideration of the Sub-aerial Algal Flora of Ceylon and a Contribution to the Study of Tropical Algal Ecology. Part I. Sub-aerial Algæ and Algæ of the Inland Freshwater". Recently, however, I have taken up work on the biological investigation of the filter-beds of Calcutta—in collaboration with Rai Bahadur Dr. G. C. Chatterjee (protozoologist), Dr. T. K. Ghose (chemist), and Mr. K. N. Das (zoologist). The work, so far as results obtained up to now show, is of immense importance from a biological point of view as suggested by Prof. Fritsch. It has been observed that there is a regular rotation in the growth of algal vegetation in the filter-beds, which is invariably associated with animal organisms, such as Protozoa, sponges, worms, larvæ of insects and molluscs sp. Growth of green algæ predominates over the blue-green ones, and diatoms are found either as pure formation or as epiphytes. *Synedra affinis* var. *fasciculata* is the most common species present in all the filter-beds. Of the algæ, *Clathrocystis aeruginosa*, *Volvox globator*, *Cladophora crispata* var. *genuina*, *Zygnema* sp., *Tribonema bombycinum*, *Gloeotrichia natans*, *Hydrodictyon* sp. often grow either as pure or mixed formation or by rotation, one appearing after the other. These grow frequently in such huge masses that they have to be scraped off and carried away in cartloads.

The life-histories of these algæ are intimately connected with and thus controlled by the physical, chemical, and climatic conditions in and around the filter-beds. Detailed algological and chemical analyses of this water of the filter-beds are being carried on, and the correlation of all the factors will, it is expected, throw much light on the aquatic biology of the filter-beds. Experiments for the control of the different species have been undertaken with the view of keeping

the filter-beds to a certain extent free from the crowded growth of algal vegetation, as the growth of the algæ sometimes reaches the point when it chokes up the action of filtration. Then the masses of algal vegetation, by dislodging from the bottom, cause fissures in the floors of the filter-beds which become the abode of animal organisms and thus the filter-beds are rendered defective. Algal contents of the oysters of the Malay Peninsula are also being investigated.

There is, therefore, a vast field for research work in various avenues for the algologists in India. There is no doubt that biological investigations of fresh and marine waters of this country are of greatest importance from the points of view of pisciculture and sanitation; for fish, one of the important foods for human beings, are directly or indirectly dependent on algal vegetation, and some lower members of algæ also by assimilation of organic matters for their growth expedite the self-purificatory action of the water.

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<sup>1</sup> Brühl, P., and Biswas, K. Algæ of Loktak Lake, *Memoirs of the Asiatic Society of Bengal*, No. 5, 1926.

<sup>2</sup> Biswas, K. IV. Papers on Malayan Aquatic Biology. 11. Freshwater Algæ, *Jour. of the Federated Malay States Museums*, vol. 14, pp. 404-435, pts. 3 and 4, 1929.

<sup>3</sup> Turner, W. B. Freshwater Algæ of East India, *Kunzl. Sv. Vet. Ak. Handl.*, 25, 1893.

<sup>4</sup> West and West, G. S. Freshwater Algæ from Burma, including a few from Bengal and Madras, *Ann. Roy. Bot. Garden, Calcutta*, 1907.

<sup>5</sup> Carter, Nellie. Freshwater Algæ from India, *Records of the Botanical Survey of India*, vol. 9, No. 4, 1926.

### The Acquired Characters of *Alytes*.

I AM glad to see from Dr. Walker's letter in *NATURE* of April 12, p. 562, that he does not dispute Kammerer's work. He is fully justified in doing so since the visit of Kammerer's teacher, Prof. Przibram, to London last year, because Kammerer's work was carried out under Prof. Przibram's supervision: and Prof. Przibram, who stayed with me, assured me that the work was sound and that he himself had seen the modified *Alytes* when alive.

But Dr. Walker asserts that the work, if fully confirmed, would afford no proof of the inheritance of acquired characters because the modified *Alytes*, if replaced in the normal conditions, would in all probability revert to the type form. This assertion implies a confusion of thought in Dr. Walker's mind, which is shared apparently by many others.

It is no explanation of Kammerer's results to say that they are due to "the presence in the germ-plasm of potentialities to respond in a definite manner to changes in the environment". Undoubtedly this power resides not only in *Alytes*, but also in greater or less degree in all organisms—otherwise there would be no possibility of evolution. The question at issue is whether the exercise of this power in one generation affects the possibility of its exercise in subsequent generations—and Kammerer's experiments not only on *Alytes* but also on *Salamandra* prove in the clearest manner that this is so. Dr. Walker apparently expects that if an animal, moved from environment *A* to environment *B*, responds by a change in growth and structure, this change should persist without alteration when it is moved back from environment *B* to environment *A*. What we might reasonably expect, and what as a matter of fact we find, is that when the animal is kept for several generations in environment *B*, the response is intensified and appears earlier in development—in a word, that it becomes more engrained in the hereditary complex, and that when it is moved from environment *B* to environment *A*,