

number occur amongst *Rotatoria*, but additions are also made to the *Rhizopods*, *Heliozoa*, and *Infusoria*. No new forms appear to have been found amongst the crustacea, mollusca, or fishes.

A third paper deals with the distribution and special natural history of the forms met with, and with the comparison of the plankton at different seasons.

There are no foot-notes through the number, but all references to literature are formed into a numbered table at the end. The plate, which is one of Klinkhardt's, of Leipzig, shows a number of the new forms discovered.

The investigations are almost entirely on the minute floating organisms, as must necessarily be the case at this date with all freshwater work not connected directly with pisciculture.

The British Journal Photographic Almanac for 1893.
Edited by J. Traill Taylor. (London: Henry Greenwood, and Co., 1893.)

THIS annual volume contains, as usual, a vast amount of useful information gathered from workers in all the various applications of photography. After a brief summary, in which the editor refers to some of the chief advances made in the science of photography during the past year, mentioning, for instance, Mr. Dallmeyer's telephotographic lens, Mr. Willis's improvement in the p'atinotype process, &c., he devotes a few pages to "some photographic methods of book illustration." Then come short contributions in which everyone has something special to say, whether it relates to a new mounting medium, a permanent toning bath, or pinhole pictures, &c. They are far too numerous to mention individually, but will be found most interesting reading. "Epitome of Progress" is the title of a series of notes by Mr. Traill Taylor, in which he refers briefly, and in some cases at length, to new methods, remedies, &c., and instruments used in the practice of the art. The formulæ and tables are as numerous as ever, while all the other information, such as lists of photographic societies, &c., have been brought up to date. The volume is copiously illustrated.

Studies in Corsica. By John Warren Barry, M.A.
(London: Sampson Low, Marston, and Co., 1893.)

MR. BARRY has twice visited Corsica, the first visit being of less than five months' duration, while the second extended from September 1882 to February 1885. He has thus had ample opportunities for the study both of the island and of its people, and in the present volume he sums up his impressions very brightly and pleasantly. Most readers will probably like best the chapters on life at Ajaccio, but they will also find much to interest them in what the author has to say about the Bush of Corsica and of the Mediterranean region.

LETTERS TO THE EDITOR.

[The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts intended for this or any other part of NATURE. No notice is taken of anonymous communications.]

Luminous Earthworms.

I HAVE recently received from a correspondent a statement which is sufficiently valuable to crave public attention. It opens up withal a very fascinating field of investigation, and one which, though it has by no means been altogether neglected by foretime naturalists, is as yet far from being fully understood.

Writing from Richmond, Surrey, the Rev. Alfred Geden, M.A., says:—"I have just heard of a phenomenon in the worm world which is new to me . . . My sister declares that one day last summer, in a village on the Thames, she saw a 'phosphorescent worm,' and describes the creature as about one and a half inches long, worm-like in all respects. My sister is sure

it was not an ordinary glow-worm, with which she is perfectly familiar; and, moreover, she called the attention of a cousin to the creature at the time, who corroborates her account. Are there worms in England capable of emitting light besides the glow-worm? If so, are they at all common?"

In reply to a series of questions, I was able to elicit these further particulars:—"It was in a garden in the village of Long Wittenham, near Didcot, on a dark evening in the latter part of September last [1892], or the beginning of October. My sister's attention was attracted by the light on the ground, and she picked the worm up. While she cannot positively assert that she saw it in motion on the ground, it certainly wriggled in her hand. For a few seconds also after putting it down her fingers remained phosphorescent."

The notice of the public, so far as I have been able to ascertain, was first directed to this phenomenon among earthworms by Grimm in 1670, but scientific observation, as we now understand it, was then scarcely known. A century elapsed before any further record was made in the periodicals of Europe which I have consulted, then came a paper by Flaugergues in 1781. This article, which appeared in Lichtenberg's magazine, was written in German. In 1873 Cohn's observations on the same subject were published in the well-known *Zeitschrift für Wissenschaft. Zool.*, while numerous recent writers have further contributed to our knowledge, especially in relation to the Continental species.

Thus in 1872 an article appeared in the French Annals of Natural Science, by Panceri, entitled "Studies in the Phosphorescence of Marine Animals," in which he states that the luminosity observed in the case of certain (earth) worms is due to a secretion from the girdle, where special glands exist, and that by the evolution of light there was no perceptible raising of the temperature. In this respect, therefore, the earthworm's glow corresponds with that emitted by the firefly, *Noctiluca*, and glow-worm. One investigator at least has tested the colour and composition of the luminosity by the spectroscope, and says that it is not uni-coloured or monochromatic, but compounded chiefly of the red and violet rays. Other students regard the substance which produces the light as homogeneous.

In 1838 Eversmann published an article on a night-shining worm in Russian, and in 1871 an English naturalist named Breeze delivered an address on the earthworm before the West Kent Natural History Society, from a meagre abstract of which we learn that he had spent some years on the subject of annelid luminosity, having studied it historically from the year 1805, when Viviani wrote on the phosphorescence of the sea, down to the date of his own delivery. According to Breeze the luminosity exists in the excreted glutinous material with which the outer skin of the animal is covered.

More than one creature has at different times borne the name of the phosphorescent worm. In 1837 Dugès, a French writer, described a species under this name (*Lumbricus phosphoreus*), with a girdle extending from the 13th to the 16th segments, and a somewhat flattened body behind. After the lapse of exactly half a century this curious creature was examined again, and named by Giard *Photodrilus*, or the luminous worm. It has eight setæ, just as our common species have, but they are separate, and not in couples. There is no gizzard, nor does the lip dovetail into the segment behind. It is a small, transparent, rose-coloured worm, and decidedly phosphorescent.

In 1843 when the British Association met at Cork, specimens of an annelid were exhibited by Dr. Allman, which he had discovered in the bogs of the south of Ireland, and which was the cause of a luminous appearance. When irritated the worm gave out a phosphorescent light, which is said to have been much increased by exposing the creature to the vapour of alcohol. The light was of that peculiar soft greenish hue which is characteristic of the phosphorescence observed in light-giving animals, and familiar to most readers in connection with the glow-worm. Another gentleman was reported to have observed the same peculiarity in some annelids which exist in the bogs of Connaught. I have been unable to find any recent reference to or confirmation of these curious observations. Ten years later Mr. Henry Cox exhibited an earthworm which was phosphorescent at a meeting of the Literary and Philosophical Society of Liverpool, held November 14, 1853.

While few records of a trustworthy nature respecting the observation of luminous worms in Britain are available, a good deal has been done by our Continental fellow-workers. Vejdovsky, who wrote a very valuable work on the various species of an-