of mine given in Walsh's "Photometry,"[1] pp. 244–245. Since the same mistake has also been made by others heretofore and bids fair to become prevalent, it seems desirable to publish a correction. I do this not for the sake of finding fault, but to prevent in so far as possible, the continued spread of mistaken ideas in regard to the subject-matter in question. It is well known how errors once incorporated in a standard text are copied and recopied without limit.

The error in question is that the instrument designated by Mr. Walsh as "The Leucoscope" is *not* the leucoscope, but the "rotary dispersion colorimetric photometer." The pertinent facts are as follows:

(1) The leucoscope is an instrument, the invention of which is commonly attributed to Helmholtz, about 1870–80.[2] It consists essentially of a quartz plate between a *Wollaston* prism and a nicol prism through which the observer views *two* images of the *same source.*

(2) The instrument which Mr. Walsh describes, and calls "The Leucoscope" is properly called the "rotatory dispersion colorimetric photometer."[3] I particularly object to naming it "Priest's leucoscope" as is done in the index of Mr. Walsh's book. It is a special form of the Arons Chromoscope[4] and its embryonic form may be seen in Zoellner's colorimeter.[5] My connection with this instrument has been to develop the theory and practice of its use in the colorimetry and photometry of incandescent sources and daylight, and to design an instrument especially suited to these purposes.

(3) In principle, manner of use and specific purpose served, the two instruments are very different. About all that they have in common is the fact that they both contain nicol prisms and quartz plates and the circumstance that I have written papers dealing with each of them separately.

It seems unnecessary to use your space to set forth in detail the distinctions between these two instruments. All confusion may be removed by consulting my papers which deal, respectively, with the two different instruments.[6]

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[1] J. W. T. Walsh, "Photometry," Constable, London, 1926.

[2] There has been some slight controversy as to the relative contributions of Helmholtz, and one of his pupils, Diro Kitao, to the development of the instrument. Edm. Rose (1863) described an instrument which may be regarded as the prototype of the leucoscope. A review of the history of the instrument and a full bibliography have been published in my paper on the leucoscope, *Jour. Op. Soc. Am. 4,* pp. 448–495, 1920.

[3] *J. O. S. A. & R. S. I. 7,* folded insert facing p. 1199, December, 1923.

[4] Leo Arons, *Ann. der Phy.* (4) *39,* pp. 545–568, 1912.

[5] J. C. F. Zoellner, "Photometrie des Himmels," Berlin, 1861; G. Mueller, "Photometrie der Gestirne," pp. 244–254, Leipzig, 1897.

[6] "A New Study of the Leucoscope . . . ," *J. O. S. A. 4,* pp. 448–495, November, 1920; "Colorimetry and Photometry . . . by the Method of Rotatory Dispersion," *J. O. S. A. & R. S. I. 7,* pp. 1175–1209, December, 1923.

## TADPOLES AS A SOURCE OF PROTOZOA FOR CLASSROOM USE

IN SCIENCE, Vol. 56, pp. 439–441, there appeared a note by Dr. R. W. Hegner on frog and toad tadpoles as sources of intestinal protozoa for teaching purposes. During the last four years the writer has examined hundreds of tadpoles for intestinal protozoa, and is able to state that he has frequently found most of the species listed by Hegner in his paper, viz., *Trichomonas augusta, Hexamitus intestinalis, Nyctotherus cordiformis, Opalina ranarum, Endamoeba ranarum,* and *Euglenamorpha hegneri,* the latter an Euglena-like flagellate with three flagella. *Giardia agilis* and *Balantidium entozoon* have never been observed by the writer. *Euglena spirogyra, Phacus* sp.? and several species of desmids and diatoms, which are normally free-living forms, are often present in large numbers in the rectum of tadpoles, in which habitat they appear to be little the worse for any contact they may have had with the digestive juices of their host.

In addition to the protozoa enumerated by Hegner several other species have been more or less frequently encountered. These are *Chilomastix caulleryi* Alexeieff 1909, *Mastigina hylae* (Frenzel 1892) Goldschmidt 1907, and *Endolimax ranarum* Epstein and Ilowaisky 1914.

*Chilomastix caulleryi* is a flagellate which lives in the rectum of the tadpoles of *Rana catesbiana* and *Rana clamata.* It sometimes occurs, in large numbers, but is likely to be overlooked among the more numerous representatives of the species *Trichomonas augusta.* Its morphology is practically identical with that of *Chilomastix mesnili* of man. Its larger size makes it more favorable for study than the human form.

*Mastigina hylae* is a large and extremely interesting protozoon which belongs to the flagellate family Rhizomastigidae. Its most striking features are the prominent anterior nucleus and the constant active streaming of the protoplasm filled with remnants of the green algae and protozoa upon which it has fed. The small anterior flagellum is inconspicuous and will be overlooked unless carefully searched for. The writer has never seen in any other cell protoplasmic streaming so vigorous and continuous as in this form. For a more detailed description of this species the reader is referred to a paper by the writer in the

*Journal of Parasitology* for June, 1925. This protozoon has been found in tadpoles of *Rana catesbiana* and *R. clamata* in New Jersey and in those of *R. pipiens* in Iowa.

*Endolimax ranarum* is a smaller amoeba than *Endamoeba ranarum*, and is much less frequently encountered. Its nucleus is more or less typical of that of other members of the genus and careful staining is required to bring it out.

On the basis of the combined experiences of Dr. Hegner and those of the writer, we may confidently expect to find in our American tadpoles most of the following species of intestinal protozoa: (1) *Opalina ranarum,* (2) *Nyctotherus cordiformis,* (3) *Balantidium entozoon* (not observed by either Hegner or the writer), (4) *Giardi agilis,* (5) *Trichomonas augusta,* (6) *Chilomastix caulleryi,* (7) *Hexamitus intestinalis,* (8) *Euglenamorpha hegneri,* (9) *Mastigina hylae,* (10) *Endamoeba ranarum,* and (11) *Endolimax ranarum. Trichomonas batrachorum* and *Polymastix bufonis* are two other species which have been found in frogs and should be searched for in tadpoles. This formidable list of intestinal protozoa makes tadpoles invaluable for teachers in protozoology and invertebrate zoology.

The writer wishes also to call the attention of bacteriologists and microbiologists to a rather unusual bacterial flora which is sometimes encountered in the rectum of the tadpole. Large spirilla with a prominent spore at each end, bacilli of a crescentic shape with a prominent spore at each end, and other equally remarkable forms have been seen by the writer while making examinations of the contents of the rectum of tadpoles.

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## THE EFFECT OF ULTRAVIOLET RADIATIONS UPON SOY BEANS

A SERIES of experiments was performed to study the effect of ultraviolet radiations upon the subsequent development of the soy bean. The full spectrum of an air-cooled quartz mercury lamp was used in every case. The plants were kept under rigidly controlled conditions.

The first outstanding result noted was that the longer the exposure the shorter the plant, that is, in successive experiments as the length of exposure was increased the internodes of the plant became shorter. The stems were very brittle and the leaf tissue very stiff and rigid.

The internal changes were equally interesting. The stems of irradiated plants were approximately one and one half times as large in diameter as the control plants. There was also a reduction of the number of medullary rays in irradiated plants, so that these plants tend to show that the meristematic tissues remain active for a very much longer period of time than in the control plants. The cells of the medullary rays under ordinary conditions remain parenchymatous but in irradiated plants have gone further and developed into xylem and phloem. Furthermore, because of differential growth the stems became hollow.

A detailed report of the work will be prepared later. The author wishes to express her appreciation to Dr. W. J. G. Land and Dr. C. A. Shull for their kind help and inspiration.

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## FLORA OF BARRO COLORADO ISLAND, CANAL ZONE

RECENTLY there appeared in SCIENCE an account of Barro Colorado Island.[1] Visiting scientists working upon plants are concerned with the names of the species to be found on the island. All such workers will be interested in a list of plants of Barro Colorado Island that has just been issued by the Smithsonian Institution. The author, Mr. Paul C. Standley,[2] who spent a week on the island, has traveled extensively in Central America and has published several articles on the flora of these regions. The flora is an annotated list without keys or complete descriptions, but the accompanying notes on common names, uses and prominent characters will be a great aid to those taking advantage of the facilities of the laboratory on the island.

Mr. Standley has also published a paper on the ferns of the island.[3] A flora of the Canal Zone by the same author is now in press.

The bibliography of papers relating to Barro Colorado Island now includes over 50 titles.

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## A DAYLIGHT METEOR

AT a golf course on Warwick Neck, near Providence, Rhode Island, I was on a fairway overlooking Narragansett Bay about one o'clock in the afternoon of June 1, in brilliant sunlight when my companion and I distinctly saw what seemed to be a small meteorite dropping over the bay. It was fol-

1 Kellogg, Vernon, "Barro Colorado Island Biological Station," SCIENCE 65: 535, 1927.

2 Standley, Paul C., "The Flora of Barro Colorado Island, Panama," Smithsonian Miscellaneous Collections 78: No. 8, 1–32, 1927.

3 Standley, Paul C., "The Ferns of Barro Colorado Island," *American Fern Journal* 16: 112–120, 1926; 17: 1–8, 1927.