table are given the percentages of living plants and of wilt-free plants of each variety sixty-eight days after planting. Most of the living plants that were diseased could be told by an external examination, but for these results all living plants were cut and examined for the presence of the discolored fibrovascular bundles.

Variety.	Culture A.		Culture B.		Culture C.		Culture D.	
	Living, Per Cent.	Healthy, Per Cent.	Living, Per Cent.	Healthy, Per Cent.	Living, Per Cent.	Healthy, Per Cent.	Living, Per Cent.	Healthy, Per Cent.
Stone	35.3	11.8	75.0	55.0	44.7	25.5	71.4	57.1
Acme	14.3	0.0	42.9	28.6	31.3	21.9	65.8	31.6
Earliana.....	32.3	3.2	63.5	36.5	37.3	17.7	96.0	70.0
Wilt-resistant	62.5	31.3	.818	56.8	68.2	34.1	95.1	78.0

This table shows the comparatively greater resistance of the wilt-resistant variety as compared to the others, and it also shows the large percentage of susceptible plants that could be eliminated before setting in the field.

Although the investigations on this method are far from complete, it seems well at this time to put it into the hands of other workers with the hope that it may be found useful.

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DO MOVEMENTS OCCUR IN THE VISUAL CELLS AND RETINAL PIGMENT OF MAN?[1]

THE statement is commonly found in text-books of gross[2] and microscopical[3] anatomy, as well as in some texts of physiology,[4] that the retinal pigment of the human eye undergoes positional changes in light and in darkness. The pigment, which, in the dark, forms a compact layer next to the choroid, is said to migrate towards the external limiting membrane in the light, thereby forming processes which interdigitate with the rods and cones. If not explicitly stated, it is at least implied that this response is well marked and the actual migration extensive.

This view is so generally accepted as expressing a commonplace of retinal physiology that it is well worth while to examine the facts upon which its validity rests.

That photomechanical changes take place in the retinal pigment of anuran amphibians, a fact first established independently by Boll[5] and by Kühne[6] on the frog in 1877, may be substantiated by any one who will perform the necessary experiments. Similar results, in many cases even more striking, were obtained on fishes (Stort, '86).[7] Angelucci ('78)[8] likewise first reported this condition to hold for *Triton* as a type of urodele amphibian, and Stort ('87),[9] using the pigeon for material, again presented the earliest demonstration in the retina of birds.

When reptiles and mammals are considered, on the other hand, the literature at once becomes contradictory. Angelucci ('90),[10] however, reported a rather limited pigment migration in the retina of *Testudo marina*, and Chiarini ('06)[11] also states that a distinct but

[1] Contributions from the Zoological Laboratory of the Museum of Comparative Zoology at Harvard College, No. 263.

[2] *E. g.*, R. Howden, 1913, in Cunningham's "Anatomy," 4th ed., p. 817. E. A. Spitzka, 1910, in Gray's "Anatomy," 18th ed., p. 1106. Piersol, G. A., 1906, "Human Anatomy," p. 1463.

[3] *E. g.*, Bailey, F. R., 1913, "Text-book of Histology," 4th ed., p. 556. Piersol, G. A., 1913, "Normal Histology," 10th ed., p. 348.

[4] *E. g.*, Halliburton, W. D., 1910, "Handbook of Physiology," 9th ed., p. 843. Starling, E. H., 1912, "Principles of Human Physiology," p. 630 (by implication).

[5] Boll, F., 1877, *Monatsber. d. k. preuss. Akad. d. Wiss. zu Berlin*, pp. 72–74.

[6] Kühne, W., 1877, *Untersuch. a. d. physiol. Inst. d. Univ. Heidelberg*, Bd. 1, pp. 15–103, Taf. 1.

[7] Stort, A. G. H., Van Genderen, 1886, *Bericht über d. 18. Versamm. d. Ophthal. Gesell. zu Heidelberg*, pp. 43–49.

[8] Angelucci, A., 1878, *Arch. f. Anat. u. Physiol., Physiol Abt.*, pp. 353–386.

[9] Stort, A. G. H., Van Genderen, 1887, *Arch. neérland. d. Sci. exact et nat.*, Tom. 21, pp. 316–386.

[10] Angelucci, A., 1890, *Untersuch. z. Naturlehre d. Menschen u. d. Thiere*, Bd. 14, pp. 231–357.

[11] Chiarini, P., 1906, *Arch. ital. de Biol.*, Tom. 45, pp. 337–352.

limited pigment expansion was observed in the light-adapted eyes of the lizard.

With the exception of the early results of Angelucci ('78), who maintained that definite pigment movements occur in the rabbit, there exists only one positive record for mammals—that of Chiarini ('06), describing slight changes in the retina of dogs which had been exposed to direct sunlight and to darkness. The pigment of the light-adapted animals extended in short fringe-like processes between the rods, in contrast to the densely contracted pigment of the reciprocal set. Finally, Garten ('07)[12] carried out carefully executed experiments upon the ape, ox, rabbit and rat, yet failed to observe any striking differences between the effects of light and darkness; however, in the retina of the ape, which has a minute amount of pigment, composed of needle-like granules, the pigment was extended 3 to 4 granules deep in the light and only 2 to 3 granules deep in the dark.

When, in connection with experimentation upon the retinal pigment and visual cells of certain lower vertebrates, it became necessary to review the literature of this subject, I was at once impressed with the discrepancy between the statements found in many standard texts and the actual status of our knowledge, which, I believe, has been correctly summarized in the preceding paragraphs.

That slight positional changes due to photic stimulation have been detected in the retinal pigment of certain mammals, is probably true, but no evidence has yet been presented to show that a like condition holds for man. Moreover, if, in the future, such responses are demonstrated, the results upon other mammals (cf. Garten's experimentation upon apes) would lead us to expect them to be extremely limited. Since it follows, therefore, that the loose phraseology and the misstatements to be found in many standard text-books necessarily create fundamentally wrong impressions in the mind of the reader, it is evident that the future editions of all offending texts should avoid lending aid to the perpetuation of this popular misconception.

A phenomenon related to that of pigment migration is the contractility exhibited by a definite portion of the inner member of rods and cones. The so-called "myoid" of the cone-visual cell shortens to a marked degree when, in the case of many fishes and of some amphibians and birds, the retina is exposed to light. Among reptiles and mammals, changes in the length of the cone myoid are hard to observe, yet in both groups responses to light have apparently been detected in a few instances.

Among mammals, the results of Stort ('87) on the pig stand alone in ascribing striking positional changes to the cones; Stort's measurements of one dark-adapted human eye, moreover, do not prove that movements of the cones occur in man. Chiarini ('06) obtained negative results on the dog's eye, although Garten ('07), by careful experimentation upon apes, has been able to demonstrate slight changes in the region of the fovea. The assumption, on the part of writers, of the occurrence of movements in the cones of man has been relatively rare.

The rod myoids of certain fishes, amphibians and birds are likewise responsive when stimulated by light, yet nothing has been recorded concerning the existence of this phenomenon in mammals.

It is possible, as Garten ('07) suggests, that the changes in the retinal pigment and visual cells of mammals occur so quickly that the fixing fluids through slowness of penetration fail to preserve them in an extended condition.

Leslie B. Arey

[12] Garten, S., 1907, "Graefe-Saemisch, Handb. d. gesam. Augenheilkunde," Bd. 3, Kap. 12, Anhang.

THE CONVOCATION WEEK MEETINGS OF SCIENTIFIC SOCIETIES

The American Association for the Advancement of Science and the national scientific societies named below will meet at Columbus, Ohio, during convocation week, beginning on Monday, December 27, 1915:

American Association for the Advancement of Science.—President Dr. W. W. Campbell, Director Lick Observatory; retiring president, Dr.