

Proceedings of the Iowa Academy of Science

Volume 5 | Annual Issue

Article 23

1897

Comparative Anatomy of the Corn Caryopsis

L. H. Pammel

Copyright ©1897 Iowa Academy of Science, Inc.

Follow this and additional works at: <https://scholarworks.uni.edu/pias>

Recommended Citation

Pammel, L. H. (1897) "Comparative Anatomy of the Corn Caryopsis," *Proceedings of the Iowa Academy of Science*, 5(1), 199-203.

Available at: <https://scholarworks.uni.edu/pias/vol5/iss1/23>

This Research is brought to you for free and open access by the Iowa Academy of Science at UNI ScholarWorks. It has been accepted for inclusion in Proceedings of the Iowa Academy of Science by an authorized editor of UNI ScholarWorks. For more information, please contact scholarworks@uni.edu.

COMPARATIVE ANATOMY OF THE CORN CARYOPSIS.

L. H. PAMMEL.

The fruit, or what is popularly known as the seed, of corn has been studied by a number of investigators, as Harz¹, Hunt², Goodale³, Hackel⁴, Jumelle⁵, True⁶, and Blyth⁷. The literature on the structure of the corn caryopsis is quite large; many of the works on foods discuss the subject.

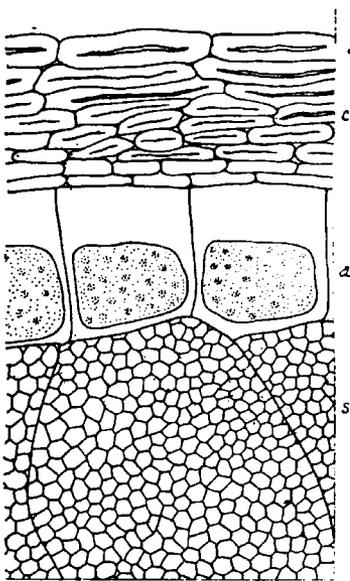


Fig. 5

Flint corn. *a*, epidermis; *c*, capsule and testa; *d*, aleurone layer; *s*, starch cells

The outer part of the so-called seed is the wall of the ovary. It begins with a greatly thickened epidermis (*a*); this is followed by a variable number of rows of thick-walled cells provided with pore canals. The wall of the ovary is frequently differentiated into several layers, usually two, and a third more difficult to make out, the inner part being less thickened than the outer. This layer contains some of the pigment in the colored varieties. The cells contain only small amounts of protein matter. The cell-walls are greatly thickened.

The wall of the ovary closely joins the testa of the seed. But one coat remains in the mature seed, the inner, the outer being absorbed in development. The testa is insignificant since the protective features are supplied by the thickened wall of the ovary. The cells are elongated, thin-walled, and

- 1 Harz Landwirthschaftliche Samenkunde. 2:1235.
- 2 Hunt, F. L. A kernel of Indian corn. *Prairie Farmer*. 58: 198. Thirteenth Rpt., Board of Trustees of Univ of Ill. 196. 1886
- 3 Goodale, G. L. *Physiological botany*. 181.
- 4 Hackel, Edward *The true grasses*. 24-25. (Eng. trans. by F. Lamson-Scribner and Effie A. Southworth)
- 5 Jumelle. *Sur la constitution du fruit d. graminees*. Soc. d. Sci. Nancy. Seanc. 28 Juillet, 1888. (According to Knoblauch. *Just Bot. Jahresb.* 16: (5) 1888.)
- 6 True. On the development of the caryopsis. *Bot. Gaz.* 18: 214. pl. 24-26. f. 10.
- 7 Blyth. *Foods, their composition and uses*. 216. (4th ed.)

in some cases may be differentiated into two parts. The remains of the nucellus may be made out in the region of the

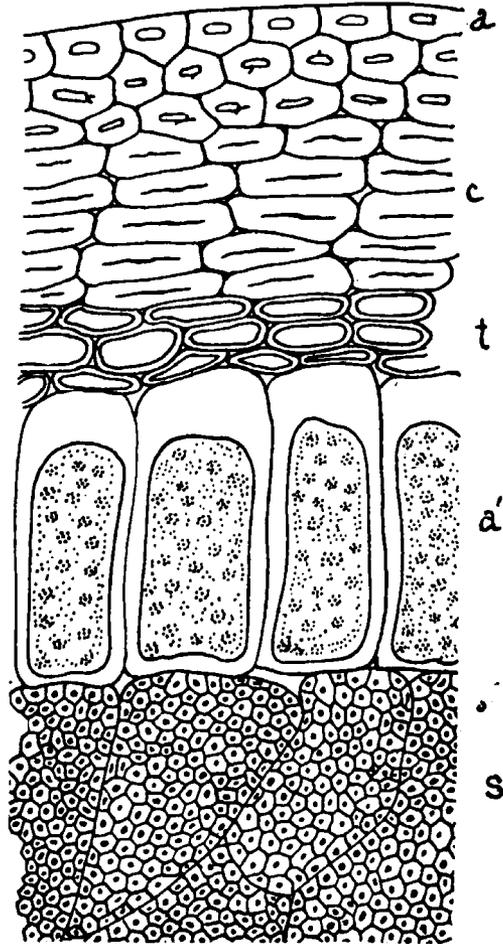
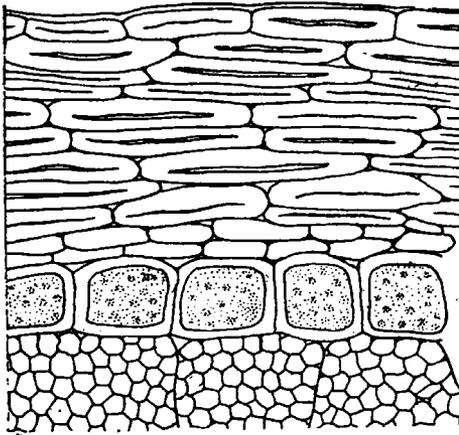


Fig. 6.

Dent corn. *a*, epidermis; *c*, capsule; *t*, testa; *a'*, aleurone cells; *s*, starch cells.

hilum. The endosperm and embryo constitute the most important part of the seed from an economic standpoint. The first layer of the endosperm consists of the aleurone. This is made up of cells nearly uniform in width and length, and surrounds the endosperm. These cells in colored varieties contain some of the pigment. In some cases the cells are somewhat longer than broad.

The wall joining the testa is greatly thickened and in some cases provided with minute canals, which connect adjoining cells.



The walls of the endosperm consists of pure cellulose. The cells are densely filled with protein grains, but no starch. The so-called gluten meal of commerce consists of the wall of the ovary, the testa, the aleurone layer and some starch cells. The layer following the aleurone consist of thinner-walled, somewhat irregular, but usually elongated cells filled with starch, at least in our dent and flint corns. The starch

Fig. 7.
Popcorn. *a*, epidermis; *c*, capsule; and testa; *d*, aleurone layer; *s*, starch.

grains appear regularly striated and with a "nucleus."

The embryo is surrounded by a small and regular row of cells where it joins the endosperm. These are followed by the

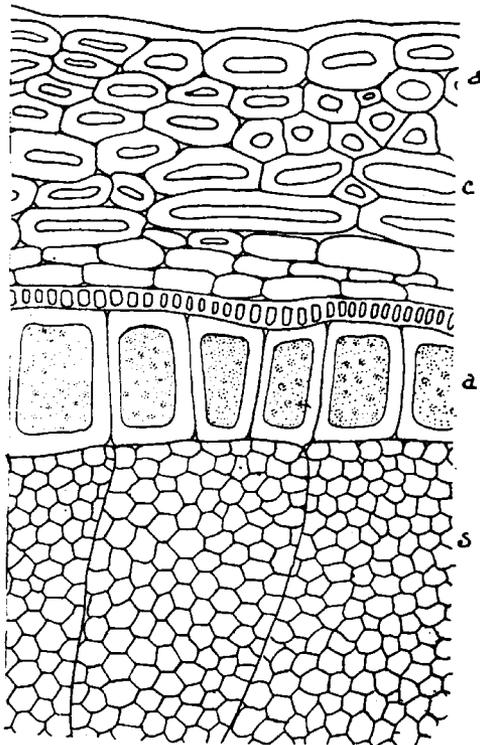


Fig. 8.
Popcorn. *a*, epidermis; *c*, capsule; and testa; *d*, aleurone layer; *s*, starch cells.

larger cells of the scutellum. They contain some starch, considerable fat, but mostly protein. The cells of the plumule

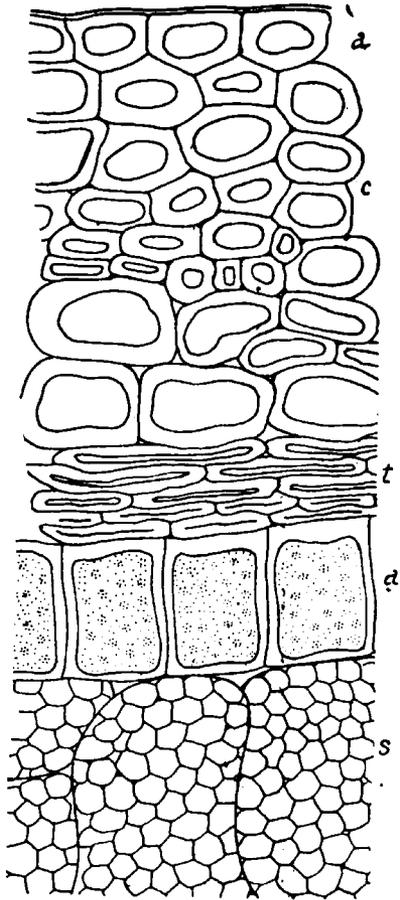
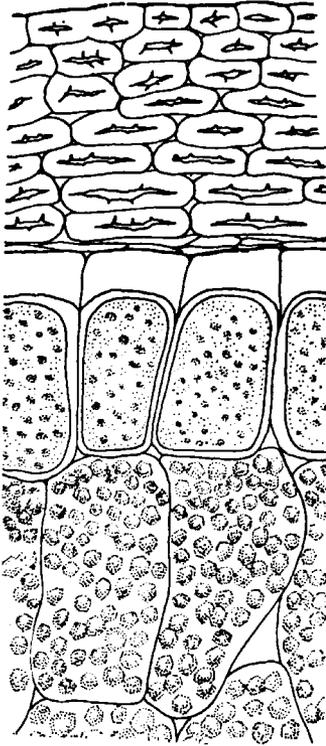


Fig. 9.

Mexican corn, popcorn type. *a*, epidermal cells of capsule; *c*, capsule; *t*, testa; *a'*, aleurone cells; *s*, starch layer.

and caulicle are smaller and contain only protein grains. The largest amount of nitrogen is therefore found in the embryo.

We may now discuss some varietal differences. Harz has indicated some differences but the varieties studied by him were not named. In yellow dent and popcorn the starch grains are solidly packed. The starch grains of the popcorn are much larger. The outer cells of the wall of the ovary are larger and more elongated. The cell-walls of the aleurone layer are provided with pore canals. In the Mexican corn of the popcorn type the wall of the ovary has large cells and those of the testa are also large. These cells as well as the aleurone cells are colored brown. In the Mexican sweet corn the blue pigment is carried in the aleurone layer as well as in the testa.



— Harz l. c.

Fig. 10.

Sweet corn, Early Minnesota. *a*, epidermis; *c*, capsule and testa; *d*, aleurone layer; *s*, starch cells.