Atresia of follicles may initiate not only processes of maturation in the egg, but also further-going changes which are not of a purely degenerative character, but consist in the formation of mitotic figures other than maturation spindles, and lead to the formation of segments with well-preserved nuclei. Such processes have been observed by ourselves as well as by various other investigators and recently new evidence of the occurrence of early segmentation in ovarian eggs has been brought forward by Newman and by Sansom. Our own findings of far-going parthenogenetic development in the ovarian egg of the guinea pig does not depend for recognition upon the interpretation of these early changes in the eggs of atretic follicles. On the contrary, the more than exceptional occurrence of the parthenogenetic embryonic structures described by us lends support to the interpretation of the changes observed in the eggs of atretic follicles as attempts at parthenogenetic development which in the large majority of cases prove abortive, but which apparently in certain cases overcome the obstacles to a further-going development.

LEO LOEB
WASHINGTON UNIVERSITY

SUBSOIL ACIDITY

IN any forest association the various plants have their rootage systems at different levels in the soil, though for the most part in the upper portion. Secondary roots may be spread over a wide superficial area with an occasional plant sending a tap-root deeper. These relations have been recently reviewed by MacDougall,[1] who also quotes Sherff as stating that plants are able to live together because the main part of their absorbing systems are placed at different levels in the soil.

Study of soil conditions at these various levels, then, is essential to an understanding of physiological behavior and ecological relations of plants growing in the open. One condition is soil acidity, and of subsoil acidity a few studies have been made. Wherry,[2] in New Jersey, dug pits and tested at twenty-five centimeter intervals to a depth of one hundred centimeters, finding a marked decrease in acidity with depth. Salisbury,[3] working at Rothamsted, England, does not tell of his method but finds a decrease in acidity to a depth of thirty inches.

The writer has made borings in areas of soil types found in southeastern Pennsylvania, in all cases in wooded areas and as typical of the whole area as possible. Surface soil conditions have been reviewed in a previous paper.[4]

All sampling was done with a soil auger; an ordinary one and a half inch wood auger fitted with 22-inch joints of gaspipe and a handle which could be uncoupled and carried in the field in a canvas case. Borings could be made to 300 centimeters, but usually bedrock or a cherty subsoil was reached at 100 centimeters or less. Care was taken to keep the auger clean; upon removing it from the boring the outer part of the "core" was scraped off and some of the remainder was pressed into a container. Shell vials were tried but found to be too fragile; seriological test tubes of size 16 × 120 mm. were adopted, being carried in a cloth-lined case in the field. They were marked at 5 cc. and 15 cc. levels, were provided with clean corks and were carefully cleaned in distilled water each time after using.

In the field a sample was tamped lightly with a glass rod to the 5 cc. level and the tube was corked. Being brought to the laboratory (the same day usually, or within twenty-four hours) distilled water was added to the 15 cc. level and the soil was thoroughly stirred. The suspension settling, the extract was tested by the colorimetric method with Clark and Lubs standards of 0.2 pH interval. A simple type of comparator was constructed, using electric light screened by blue glass. Turbid solutions were diluted one half and compared with standards which had corresponding turbid solutions placed before them.

AVERAGE pH OF SUB-SOIL SAMPLES

Depth	Hagerstown loam	Chester loam	Manor loam	Dekalb loam	Conowingo loam
S	7.025	6.781	6.480	5.607	5.571
— 15 cm.	6.945	5.793	5.375	5.524	5.421
— 30 cm.	6.859	5.477	5.577	5.599	5.691
— 45 cm.	6.916	6.175	5.850	5.521	6.018
— 60 cm.	7.006	6.293	5.887	5.666	6.218
— 75 cm.	7.070	6.216	5.983	5.750	6.170
— 90 cm.	7.075	6.230	5.733	6.000	6.166
— 105 cm.	7.100	6.233	....	....	....

From tests of over five hundred samples pH values are given in the accompanying table, averaged to the third decimal place. It will be seen that in all cases there is an increase in acidity with depth to 15 or 30 cm., then a gradual decrease toward neutrality. The extent of this variation seems correlated with the productiveness of the soil, being least in the fertile Hagerstown loam.

The relation of these results to plant life, the significance of the variation in pH values with increasing depth, and the relation to microbiotic forms of the soil will be treated in a later paper.

ARTHUR PIERSON KELLEY
UNIVERSITY OF PENNSYLVANIA

[1] MacDougall, W. B., 1922, "Symbiosis in a deciduous forest," *Bot. Gaz.*, v. 73, pp. 200–212.

[2] Wherry, E. T., 1920, "Observations on the soil acidity of Ericaceae and associated plants in the Middle Atlantic states," *Proc. Acad. Nat. Sci.*, Philadelphia, v. 72, pp. 84–113.

[3] Salisbury, E. J., 1922, "Stratification and hydrogen-ion concentration of the soil in relation to leaching and plant succession with special reference to woodlands," *Journ. Ecology*, v. 9, pp. 220–240.

[4] Kelley, A. P., 1922, "Plant indicators of soil types," *Soil Science*, V. 13, pp. 211–223.