pressly forbidden by the constitution to discuss or vote on such a matter. The by-laws of the society must be approved by the Minister of Education. It is provided that at least two thirds of the corresponding members must be Italian. At present less than one third are so, and the new constitution provides that no non-Italians be admitted to membership until the desired ratio is attained.

# DISCUSSION

## ORIGIN OF THE SOUTHERN APPALACHIAN GRASS BALDS

WITH the opening of the Smoky Mountain National Park the attention of an increasing number of scientists will be directed to the southern mountain bald problem. At the higher altitudes local grass areas varying from 1 to 100 acres in size are to be found sharply delimited in a setting of either balsam-spruce forest or the high altitude deciduous trees, such as northern red-oak or chestnut. Andrews Bald (alt. 5,860 feet) on the end of a south spur of Clingman's Dome Mountain, near the center of the park, is an excellent example of a grass bald. Roughly approximating a square in outline it presents 75 acres of nearly pure mountain oatgrass (*Danthonia compressa*), changing to a sedge (*Carex flexuosa*) at its upper wet margin. This luxuriant, deep-sodded, local grassland contrasts most amazingly with the dark virgin balsam-spruce forest which arises sharply on every side of it. From the depth of the humus layer and from the asymmetric growth of the trees bordering it, the area is known to antedate the settling of the region by white men.

To plant ecologists of the eastern United States, the origin of the grass balds has been an unsolved riddle. If natural forces (including fire) have been involved, why haven't much larger areas of the high mountains in the last ten or twenty centuries gone over into "bald"? But the balds are mere dots on the mountain landscape.

On the basis of intensive studies made during the past summer, the hypothesis is presented here that many of the grass balds are in reality ecological artifacts of Indian origin; they represent old Indian, high mountain, summer camp sites, which when abandoned went through a ruderal stage into the oatgrass subclimax, a community which under the climatic conditions of the high ridge and mountain tops of the southern mountains is able to resist the invasion of the original forest almost entirely and to a marked degree the shrubs of the environment as well.

The Indian encampment hypothesis is supported by the following facts: Indians preferred the ridge trails for travel and hunting. The grass balds are generally located on broadly rounded ridge or knob tops (never on sharp ridges useless for camp purposes) and on the warm southern exposures of these. Unusually good springs may be found at or near the lower margins of the grass areas. Disturbed areas in certain balds were found in which the plant succession leading to the grass was taking place, a succession never noted following the destruction of the forest by logging or fire.

This grass bald succession into a subclimax may be observed frequently on the high altitude trails. In fact, many long trail sections in rather open forest are nothing but linear grass balds, showing in every respect the true bald character. And the initiation of these trail balds is wholly due to human interference operating at the soil level.

Fire in balsam-spruce is universally followed by the "fire-cherry" community, which under repeated fire succeeds itself by basal shoot regeneration. Fire alone can not explain the origin of the grass balds nor, it is believed, can any other natural factor or combination of natural factors.

A fuller presentation of this hypothesis is in preparation which, it is believed, will go far in solving the riddle of the origin of the Southern Appalachian grass balds.

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## BEHAVIOR OF THYROID FOLLICLES IN THE HARVEY-LOOMIS CENTRIFUGE MICROSCOPE

AT Uppsala Universitet, with the collaboration of Professor The Svedberg and Kai O. Pedersen, I observed the extrusion of the colloid from the thyroid follicles in the ultra-centrifuge at a centrifugal force of 100,000 to 200,000 times gravity and the precipitation of thyroglobulin in the colloid immediately after its extrusion. It was observed that the thyroid cells were heavier than the colloid. In order to observe the details of this process I have placed rat and Necturus thyroid in the Harvey-Loomis centrifuge and observed it while subjected to a centrifugal force of 10,000 times gravity. This force is not sufficient to cause the colloid to pass through the connective tissue capsule of the thyroid follicle at any appreciable rate. However, the mechanism of its liberation from the thyroid follicle itself can be seen. Occasionally a number of cells of the thyroid follicle break loose and fall through the colloid, thus leaving a hole in the follicle through which colloid could escape if it could get out through the connective tissue layer. Since in the living animal there are lymph spaces and blood

vessels in this connective tissue layer there is, then, the means for transportation of the colloid into the general circulation. Since cells are not injured when subjected to centrifugal force of 200,000 times gravity and, yet, are sometimes separated by centrifugal force of 10,000 times gravity, this indicates that the cells are relatively loosely held together, and it seems probable that it would be much easier for the colloid to pass out between the cells than it would through the cells; in fact, nothing was observed to have been lost from the cells when they were subjected to centrifugal force of 200,000 times gravity and then made into histological preparations (3 μ thick) by Miss B. Sandin under the direction of Professor Erik Agduhr. These show (besides a displacement of chromatin in the nuclei) the displacement of cells of the follicular epithelium. Those of the rabbit show least displacement, those of the hog more, and those of a thyrotoxic human goiter most. Since Marine obtained symptoms of thyrotoxicosis by injection of thyrotropic hormone of anterior pituitary I tried the effect of thyrotropic hormone given me by Dr. Collip, on the Necturus thyroid in Ringer's fluid in the cell of the Harvey-Loomis centrifuge under a layer of oil to prevent evaporation. The cells of the thyroid treated with thyrotropic hormone were loosened more rapidly than those of a control slide without the hormone, but several days were required for complete loosening of the cells so that they would completely precipitate through the colloid in three minutes centrifuging at 10,000 times gravity. The colloid passed out of the connective tissue capsule after the precipitation of cells.

In Amphioxus the thyroid-homolog is a gland of external secretion. With its transformation into a gland of internal secretion the passage of secretion into the lumen still takes place. Some mechanism must be provided for the secretion to reach the general circulation. Since thyroglobulin has a molecular weight of nearly 700,000, being perhaps the largest molecule of a simple protein, diffusion through a semipermeable colloid membrane seems out of the question. This paper offers a suggestion. Conclusive observations could only be made on the living animal.

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## EFFECTS OF ETHYLENE ON THE PLANT GROWTH HORMONE

IN view of the discussion of results of recent investigations of Hitchcock,[1] Van der Laan[2] and others in this journal,[3] it may be permitted to recall that the main conclusion expressed by Van der Laan reads as follows: "Alle diese Punkte weisen m.E. in die Richtung, dass die Bildung des Wuchsstoffes in der Zelle auf einen enzymatischen Prozess beruht."

If this consideration can be regarded as correct then we may bear in mind the conclusion expressed by Michener that all the effects of ethylene on growth are to be explained as indirect effects. This would be in agreement with earlier investigations to which we referred recently,[4] being also the foundation of practical results in the field of tobacco fermentation in the presence of minute quantities of certain gases, reported some months ago.[5]

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## MIGRATION OF GRAY SQUIRRELS

IN SCIENCE for December 6, 1935, Ralph C. Jackson ventured an explanation of the migration of gray squirrels from New England into New York by postulating that red squirrels are responsible for the grays' emigration. Mr. Jackson says: "It is not generally known that a large percentage of gray squirrels are emasculated annually by the pugnacious reds. In years past the writer has shot and trapped alive a large number of gray squirrels and close observation showed 98 per cent. mutilation."

It seems logical to consider that (1) the testes of grays may be withdrawn into the abdominal cavity, except during the breeding season; (2) in immature squirrels the testes may not have migrated into the scrotum; (3) *Cuterebra emasculator* larvae may induce a condition that could be mistaken for castration. The actual emasculation of gray squirrels by reds remains a highly obscure and controversial point among zoologists and is in direct opposition to my experience with pet red and gray squirrels which were confined within the same cage.

According to Seton,[1] Merriam in "Mammals of the Adirondacks" (p. 226) and Jackson in "Wiscon. Mamm." (p. 87) consider the lack of food a causative factor in migrations of gray squirrels. It is interesting to note that this year there is a pronounced lack of winter food for gray squirrels in New England. Beech, acorn, and other nut crops were very slight this year. Game wardens and reliable woodsmen all over New England recently predicted a hard winter for gray squirrels. This information was imparted to the writer by questionnaires distributed while conducting a survey of winter food for wildlife. This factor

[1] Contributions from Boyce Thompson Institute, 7, 87; 1935.
[2] Thesis, Utrecht, 1934, p. 737.
[3] H. D. Michener, SCIENCE, 82: 551, 1935.
[4] F. F. Nord, SCIENCE, 79: 159, 1934.
[5] *Die Umschau*, 39: 202, 1935.
[1] E. T. Seton, "Lives of Game Animals," Vol. 4, Part 1.