DISCUSSION

THE HISTOLOGICAL CHANGES IN THE PITUITARY CAUSED BY ESTROGEN

LONG-CONTINUED estrogen injections into animals are known to result in enlargement of the pituitary, vascularity, loss of chromophil granules and increased numbers of chromophobe cells showing mitoses, hypertrophy of the Golgi apparatus and mitochondria. It has been stressed repeatedly by Severinghaus[1] that these changes are all cytological manifestations of excessive discharge by the pituitary of secretory products. However, estrogen inhibits pituitary secretion of FSH and growth hormone.

Severinghaus has regarded the cytological changes that are indicative of hyperfunction of the pituitary resulting from estrogen as an unsolved contradiction to the physiological evidence of hypofunction. He writes: "How may these apparent contradictions of cytology and physiology be reconciled? No complete and convincing answer is available, but certain suggestions may be relevant." His suggestions are based on the assumption that the cytological and the physiological evidence are concerned with the same pituitary factor, namely, the gonadotropic.

It seems to me the difficulty in this apparent paradox is that the cytologist is assuming that the hyperfunction, of which he sees microscopic evidence, is of the gonadotropic hormone. It seems that all can be reconciled if one thinks of the possibility that the cytological appearance of hypersecretion may be a matter of secretion of the pituitary factor stimulating the mammary gland, which is produced with such intensity that the pituitary is diverted from producing adequate amounts of gonadotropin and growth hormone, and is stimulated to compensate by excess production of precursor cells.

Those studying pituitary histology have largely overlooked the mammary gland hyperplasia and secretion of milk induced by estrogen. Meites and Turner[2] review their own experiments and others, proving that estrogen induces lactation in virgin animals and increases the lactogen content of the pituitary. Those who have studied induction of lactation by estrogen have usually not studied pituitary histology. In parabiotic rats, the writer[3,4] found excess endogenous estrogen caused enlargement and degranulation of the pituitary, secretion by the mammary gland, regression of corpora lutea and stunting of body growth. It seems reasonable to suppose that when the pituitary is stimulated by estrogen to lactogen production in excess, a demand is made upon all available precursor cells so that there is inability of the pituitary to form FSH, LH and growth hormone. Furthermore, this may explain the histological appearance of the pituitary in pregnancy. The so-called pregnancy cells are no longer regarded as a specific type of cell, but as degranulated chromophils. Because these cells show hypertrophy of Golgi apparatus and mitochondria and loss of cell granules, Severinghaus[1] interprets these changes as indicative of secretion by the pituitary, and again implies that he means secretion of gonadotropins, as he states that "Physiological experiments have led to a rather general conception that pregnancy inhibits the secretory activity of the anterior lobe. . . . Cytological findings point strongly in an exactly opposite direction." In the light of what has been said, is it not reasonable to regard the cytological changes in the pituitary in pregnancy as due to the high estrogen production by the placenta? Bachner[5] and Severinghaus[1] pointed out similarity between the effects of estrogen on pituitary cytology and the appearance of the pituitary in pregnancy. It seems reasonable to ascribe the histological changes to hypersecretion of the pituitary factor stimulating the mammary gland during the period when the breast is undergoing hyperplasia preliminary to lactation and to secretion of lactogen when the final period of pregnancy is reached.

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[1] A. E. Severinghaus, in "Sex and Internal Secretions" by E. Allen. Second edition, 1939. Williams and Wilkins Company, Baltimore.
[2] J. Meites and C. W. Turner, *Endocrinology*, 30: 711, 719, 726, 1942.
[3] I. T. Zeckwer, *Arch. Path.*, 30: 461, 1940.
[4] I. T. Zeckwer, *Federation Proceedings*, 1: 186, 1942.

G. J. ROMANES ON THE EXCITABILITY OF MUSCLE

ALL students of evolutionary theory are familiar with the fundamental contributions of George John Romanes in that field, but it is to be regretted that his physiological studies are not nearly so well known. Inasmuch as the elucidation of the electrical and chemical factors underlying muscular fatigue is a most important objective of research in neuromuscular physiology, Romanes' work along this line should be recalled.

In a letter[1] to Charles Darwin, dated August 13, 1877, Romanes says:

[5] F. Bachner, *Ztschr. f. Geburt. u. Gynäk.*, 106: 87, 1933.
[1] Ethel Romanes, "Life and Letters of George John Romanes," second edition, Longmans, Green, London, 1896, page 64.

I am very glad you have drawn my attention prominently to the localizing function in Drosera, as it is very likely I have been too keen in my scent after nerves; and I believe it is chiefly by comparing lines of work that in such novel phenomena truth is to be got at. And this reminds me of an observation which I think ought to be made on some of the excitable plants. It is a fact not generally known, even to professed physiologists, that if you pass a constant current through an excised muscle two or three times successively in the same direction, the responses to make and break become much more feeble than at first, so that unless you begin with a strong current for the first of the series, you have to strengthen it for the third or fourth of the series in order to procure a contraction. But on now reversing the direction of the current, the muscle is tremendously excitable for the first stimulation, less so for the second, and so on. Now this rapidly exhausting effect of passing the current successively in the same direction, and the wonderful effect of reversing it, point, I believe, to something very fundamental in the constitution of muscular tissue. The complementary effects in question are quite as decided in the jelly-fish as in frog's muscle; so I think it would be very interesting to try the experiment on the contractile tissues of plants.

The discovery of the above-described phenomenon is generally credited to Gulacsy, who reported it in 1929.[2] When one considers that Romanes also first observed, in the umbrella of the jelly fish, what is now known as fibrillation, it would seem appropriate to take cognizance of his important physiological research by attaching his name to one of these phenomena. It is therefore suggested that the recovery of excitability of a tissue upon reversal of polarity of a stimulating current be called the "Romanes effect."

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THE GENERIC NAME OF THE SAND FLY

IN a paper published in SCIENCE for May 26, 1944, Dr. Charles T. Brues stated that I overlooked the reason for spelling *Flebotomus* with a "ph" and not with an "f" as I claimed it should be spelled. Rondani[1] in his original description spelled the word *Flebotomus*. Dr. Brues claims that this is an evident typographical error on Rondani's part and as such should be corrected. I can not see where this can be considered a typographical error as Rondani used it many times. Dr. Brues bases his arguments on the fact that the word *Flebotomus* was derived from the Greek words vein (φλερὸς) and cutting (γομή) and the correct Latinized form would be spelled with a "ph" and not "f." This then becomes a question for the students of classical languages; furthermore it is the custom of Italians to translate the Greek "ph" as "f." Rondani very often deviated from the standards that are now accepted as proper in Latin and there can be little doubt that the name was printed the way he intended. According to the general understanding of generic names, the name must be used as originally spelled except when there is an absolutely unquestioned typographical error. Since the use of *Flebotomus* by Rondani is not an unquestioned typographical error I believe that Dr. Brues' argument is without foundation and the spelling *Flebotomus* is correct.

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CHATHAM, N. J.

[2] Z. V. Gulacsy, *Arch. f. d. ges. Physiol.*, 223: 407, 1929.
[1] *Mem. Prima. Serv.* Dipt. Ital., 1840, p. 12.

A SURVEY OF FOOD PRICES

PALO ALTO is a university town of about 18,000 population. Some of the residents are engaged in business in San Francisco, some are retired, while others, normally a small proportion of the whole, are employed by industries in Palo Alto and adjacent communities. Otherwise the town may be regarded as a typical university community—the residents engaged in activities that center about Stanford University.

Since 1939 a shopping survey has been made among the retail food stores of Palo Alto, in all cases during the third or fourth week of May. The results may be of more than local significance, for they indicate trends in retail food prices that are probably apparent in other communities.

Year by year the same items were priced. To give a proper weighting to the list the quantities of various foodstuffs required for a liberal diet were used. The cost of such a diet was calculated for one week's maintenance of an adult man engaged in moderate physical activity.

While it is recognized that many different liberal diets could be devised, all would be characterized by being comparatively low in highly processed and refined cereals and comparatively rich in so-called protective foods and high quality protein foods. The particular diet that we have priced contains an abundance of dairy products, fresh fruit and vegetables and high-quality proteins. Differences in regional dietary practices or in seasonal availability of foodstuffs would permit many variations without serious trespass upon the limits of a liberal diet. The particular foods about which these surveys have centered would provide per day approximately 3,180 calories, 137 gm of fat, 318 gm of carbohydrate, 107 gm of protein, 1.36 gm of calcium, 2.04 gm of phosphorus, 20 mg of iron, 15,000 units of vitamin A or its equivalent, 160 mg of ascorbic acid, 370 units of vitamin D,