

TABLE I.
Rise in Blood Pressure from Adrenalin.

Normal Dogs		Hyperthyroid Dogs	
mm. Hg.	%	mm. Hg.	%
24	20.7	16	12.3
23	38.3	25	17.2
40	30.8	7	5.3
10	7.2	20	24.4
23	13.4	7	6.8
34	31.5	12	15.8
20	15.9	6	8.8
39	26.4		
36	30.5		
Aver. 26.6	23.7	13.3	12.9

TABLE II.
Fall in Blood Pressure from Putting Constrictor in Place.

Normal Dogs		Hyperthyroid Dogs	
mm. Hg.	%	mm. Hg.	%
4	3.6	52	45.0
9	10.8	45	32.2
18	11.4	62	47.0
7	5.4	16	20.0
30	16.0	41	38.8
7	6.4	22	29.0
7	5.6	6	8.6
6	4.2		
10	9.1		
Aver. 11.0	8.1	34.9	31.5

hyperthyroidism; and (2) that merely putting a ligature in place for constricting the hepatic veins induces an average fall in blood pressure 3 times as great in hyperthyroid as in normal dogs.

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Effect of Oestrogenic Hormone Administration upon Nasal Mucous Membrane of the Monkey (*Macaca mulatta*).

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Recently, in this laboratory, an opportunity¹ occurred to investigate the condition of the nasal mucosa in normal monkeys, both

¹ Bachman, C., Collip, J. B., and Selye, H., *Proc. Royal Soc.*, Series B, No. 802, 1935, **117**, 16; *Proc. Soc. Exp. Biol. and Med.*, 1936, **33**, 549.

mature and immature, and in those treated with crystalline oestrone and oestriol, and with emmenin.

The colony consists of 28 animals. Three are males, 2 immature and one adolescent; 5 are immature females, 4 adolescent females (one a castrate) and 16 are mature females, of which 3 are castrates.

For 8 months nasal examination, using a Cameron speculum, was made weekly; first by 3 examiners, later by 2. The examiners were unaware of the monkey's sex, whether it was mature, and whether it was under treatment. Two other examiners observed nipples, face, back and sex-skin 3 times a week. Their observations were disclosed to the nasal observers after periods of 3 months, when all data were charted on one-year paper.

Normal variations in nasal mucosa color were grouped in a zone extending from "pale" to "healthy red", above which 3 degrees of redness and swelling subsequently came to be recognized. Understatement of impressions of color change was encouraged.

Treated Animals. When nasal examinations commenced there were already 14 animals in course of treatment with oestrogenic hormones; these were studied using the untreated remainder of the colony as controls. Two adult female castrates and one adolescent female castrate, treated with daily hypodermic injection of 500 γ oestrone for 50 to 75 days, were examined during the last 3 to 10 weeks of the period. Typical changes¹ were produced in the nipple, sex-skin, face and back. The 2 adult castrates were examined nasally 12 days after injection had begun, when the conchae showed maximal redness (R.3) in one, and marked redness (R.2) in the other, this becoming maximal in about a week. The peaks were sustained for about 2 weeks; thereafter, despite continued treatment, the color steadily faded till, when treatment was stopped, it had approximately reached normal level, preceding the fading of color in the other sex-skin areas by about a week. The adolescent castrate was seen only during the last 2 weeks of treatment, when the nose showed marked reddening, as did also the nipple, face and sex-skin. Two intact adolescent females, treated similarly, were examined nasally only during the last 2 weeks of treatment. One showed abnormal redness on the 3 occasions examined, while the other did not; this does not mean, of course, that the nose may not have responded earlier in treatment.

Furthermore, nasal reddening was maximal in a young adult female and an immature male treated daily by mouth with one mg. oestriol (theelol) in 10% alcohol, for 70 days, with weekly nasal examination throughout; and a positive nasal response was seen in

9 animals treated with adequate doses of emmenin by oral, hypodermic and intramuscular routes.

Untreated Females. As a control group 12 females were examined under exactly the same conditions as the injected animals. Four were observed for 8 months, 3 for 7 months, 1 for 6 months, 2 for 5½ months, 1 for 4 months and 1 for 3 months; those observed for the shorter periods were added to the series as time went on. At the beginning 7 were cyclic adults, while 5 were described as "immature". Of these last, 3 were adolescent and developed the full cycle, with menstruation, during the latter half of the period of observation. One animal, examined for 4 months, remained immature and acyclic throughout. Two of the cyclic group menstruated irregularly.

Only when the weekly state of the nose was charted on one-year paper together with graphs of redness and/or swelling in the nipple, sex-skin, face and back, together with the indoor and outdoor temperatures and observations as to whether or not the animal had been allowed out, did the following facts become apparent.

1. The nasal variations are not significantly related to temperature variations.

2. There is a seasonal increase in the degree of color of the nasal mucosa as well as in the degree of activity manifest in the several sex-skin areas, with which the former is coincident. In the adults this occurs in September and October, which is the mating season; in the "immature" group, however, it was most marked in November. This may be due to the fact that the series is very small (5 animals), or it may be that the adolescent animal responds somewhat more slowly to the seasonal stimulus.

3. In the untreated cyclic female monkeys there was a periodic rise in nasal mucosa color and activity, most marked in September and October and least in January and February. The peak intervals varied in length in different animals; in the group they averaged 28 days. In the animal in which they were shortest, the average was 21 days, and in the animal in which they were longest 33 days. In the group there was a total of 52 "monkey-months" nasal observation and 45 "nasal peaks" were seen. In 89% of these there was coincident nipple activity, in 84% sex-skin activity, in 69% activity in the face, and in 28% activity in the back (swelling). Finally such nasal peaks were 8% more regular as a manifestation of sexual cyclicity than uterine bleeding. They were found to occur "pre-menstrually" in 60%, coincident with the bleeding in 16% and "post-menstrually" in the remainder. We also observed in

a number of instances that the nasal redness peak in a given month might be double with a remission synchronous with the remission in sex-skin coloration.

In the younger, untreated group 13 nasal peaks were observed in 19 "monkey-months" observation. The intervals were more irregular and somewhat longer than in the adult group, averaging over 30 days; with 77% of them there was coincident nipple activity, in 69% also sex-skin and face activity and in one case there was also swelling of the back. Irregular menstruation or amenorrhea was more frequent than in the adults, which accounts for the fact that in this group the nasal peaks were 16% more regular as a manifestation of sexual cyclicity than uterine bleeding. As regards their position in the cycle more than half of them were clearly "pre-menstrual", while the remainder continued or occurred while bleeding was taking place; none were "post-menstrual". Owing to amenorrhea, only half the peaks could be related to menstrual bleeding.

We should like to make it quite clear that in a cyclic untreated animal, even after months of practice in nasal examination, neither of the observers is of opinion that a single nasal examination would enable him to state with certainty the time in the cycle at which the inspection is made, due to the great variation in color from animal to animal; but they are convinced that observations made over a period of several months will reveal variations that will assume significance when charted with graphs of activity in the other sex-skin areas.

Summary. 1. The nasal mucosa of the intact monkey (*Macaca mulatta*) responds to the administration of oestrogenic substances, crystalline oestrone and oestriol, and emmenin in the manner of and synchronously with the changes known to occur in the nipple, sex-skin, face and back. 2. The response is most clearly seen in the "middle" and inferior conchae which show reddening and/or swelling. 3. The oestrogenic substances mentioned are effective in both females and males, immature and adult animals. 4. The effect can be produced in female castrates by crystalline oestrone and oestriol. 5. In the untreated immature and adult female animal peaks of nasal activity normally occur, chiefly "pre-menstrual" in time, and at intervals of about 28 days. 6. Such naturally occurring nasal cyclical activity is most marked in the autumn months, which is the mating season.