tional × barred 7; barred × exceptional × exceptional 4; exceptional × barred × barred 20.

These findings do not support the genetic interpretations advanced, which, incidentally, are untenable from an embryological point of view.

It therefore appears in greater harmony with the observations to consider the potentialities for both barring and leghorn as continually present in the plumage of the hybrid. The exteriorization of one or other character as well as the intermediate forms may be considered to rest upon the interaction of the genetic factors for these characters with variable morphogenetic factors such as rate of growth which has been shown to be effective in the production of variations in pattern in the feather[4] and in the entire plumage.[5]

Hence in identical physiological milieu regeneration of identical exceptional feathers may indeed be encountered. It also follows that determination of the plumage pattern of the hybrid should prove amenable to agents acting through the cytoplasm such as temperature, etc., and while considerable difficulties are to be expected, experiments along these lines are now under way.

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Experiments in Endobronchial Stenosis.

CORNELIUS B. WOOD. (Introduced by Elliott C. Cutler.)

From the Laboratory of Surgical Research, Harvard Medical School.

The production of bronchial stenosis by the simple method of the endobronchial application of a caustic has given rise to considerable experimental work. Adams and Livingstone painted the orifice of a bronchus with a 35% silver nitrate solution, which resulted in complete stenosis of that bronchus in a high percentage of attempts. This demanded repetition in view of the many possibilities for the application of such a method in clinical conditions.

Following the technique of Adams and Livingstone[1] we have failed to produce complete stenosis in either dogs or monkeys in experiments during the last 1½ years. Either we produced so great a

[4] Lillie, Frank R., and Juhn, Mary, *Physiol. Zool.*, 1932, **5**, 124.

[5] Juhn, Mary, and Gustavson, R. G., *J. Exp. Zool.*, 1930, **56**, 31.

[1] Adams, W. E., and Livingstone, H. M., *Ann. Surg.*, 1932, **95**, 106.

destruction that rupture of the bronchus or a serious pneumonitis distal to the bronchus occurred, or stenosis failed to result. Stenosis with complete collapse of the lobe distal to this occurred in but a small percentage of our animals.

The desirability of the method led to a search for other solutions which might be more efficacious. To produce a permanent bronchial occlusion by a safe method, the substance should act slowly and over a long period of time. It must penetrate deeply and produce a peribronchial fibrosis with little damage to the mucosa of the bronchus or to the lung distal to the application. If it be used on the bronchus to a lobe, the seat of an inflammatory process, there should be ideally no denudation of the epithelium of the bronchus.

Concentrated solutions of the acridine dyes were tested for this purpose, since it is well known that when these dyes are used for urethral irrigation they produce considerable periurethral fibrosis. Our experiments with 37 dogs show that a 25% aqueous solution of acid acriflavine applied to a bronchus by the bronchoscopic route produces with great regularity in from 3 to 4 weeks an occlusion of that bronchus. One end of a stiff wire is wrapped with cotton and this is moistened with the solution. The cotton applicator should be large enough to fit the lumen of the bronchus to be treated snugly, so that the acriflavine may have contact with the entire surface of the wall of the bronchus. Care must be observed to wipe any excess from the cotton applicator before its insertion. The applicator is left firmly in place in the bronchus for 6 to 8, and occasionally 10 minutes.

Following treatment, the dye quickly penetrates to the peribronchial tissues. If such a bronchus is examined one to 2 hours later the intense yellow staining can be seen in these tissues. The epithelium and outer layers of the submucosa are destroyed by the drug, but within one to 3 days a firmly adherent mucoid plug forms which completely encases and protects this denuded area. A temporary atelectasis is thus formed in the lung distal to the plug.

This mucoid plug remains in place for 8 to 10 days, at which time the rapidly regenerating epithelium has grown over the submucosa, separating it from the mucoid plug. The loosened cast is then coughed out, and the lung distal becomes air-containing. Thus at no time is the damaged wall exposed to possibilities of infection.

Complete collapse of the middle and accessory lobes occurred with a single application. In the case of the upper and lower lobes at most 2, and in rare cases, 3 applications were necessary, largely

because of the numerous, partially hidden orifices to these lobes. The peribronchial connective tissues have become fibrosed within 3 to 4 weeks and they contract, compressing and buckling the bronchial cartilages, to produce a partial collapse of the lumen of the bronchus. Proliferation of fibrous and granulation tissue from the submucosa further compresses the mucosa and occludes the lumen of the bronchus.

The procedure described is quite safe and surprisingly efficient. It is so benign that the bronchi of an entire lung may be safely treated at one bronchoscopy. Grossly, at bronchoscopy, there can be seen no ulcerations on the mucosa. There have occurred no pulmonary hemorrhages, and sections show little or no damage to the blood vessels. The dogs following bronchoscopy, even after the bronchi of an entire lung have been treated, appear in good condition, and it is rare that they run one to 2 degrees of temperature. They eat well and, except for a hacking cough, appear entirely normal. In our first 12 animals, when the technical application had not been entirely determined, 4 deaths occurred, 2 from pushing the applicator through the bronchus, and 2 from overcauterization. In the last 25 animals 100% were given satisfactory and complete stenoses.

It would appear from such observations on these dogs, that a simple and efficient method for the production of bronchial stenosis has been obtained.

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Ascorbic Acid from Iris and Other Plants by a Simplified Method.*

EMIL J. BAUMANN AND NANNETTE METZGER.

From the Laboratory Division, Montefiore Hospital, New York City.

We have had great difficulty in obtaining more than a few milligrams of the antiscorbutic vitamin, ascorbic acid, from either plant sources or suprarenal glands by the published methods of Szent-Györgyi[1] or of Waugh and King[2] and Svirbely and King.[3] Large

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1 Szent-Györgyi, A., *Biochem. J.*, 1928, **22**, 1387.

2 Waugh, W. A., and King, C. G., *J. Biol. Chem.*, 1932, **97**, 325.

3 Svirbely, J. L., and King, C. G., *J. Biol. Chem.*, 1931, **94**, 483.