hand, using the analytical data of Meyer³, on the glycoprotein, ovomucoid- α , a quotient of nearly 1/9 is obtained.

Our findings would confirm the assumption of Karl Meyer and John W. Palmer as to the mucoid nature of gonadotropic fractions.

It may be of interest that the gonadotropic hormones apparently do not contain cystine.

G. FLEISCHER.
E. SCHWENK.
K. MEYER.

Schering Corporation,
Bloomfield, N.J.
and

Department of Ophthalmology,
College of Physicians and Surgeons,
Columbia University,
New York City, N.Y.

¹ NATURE, 142, 115 (1938).

² Kurzrok, "Endocrines in Obstetrics and Gynecology", p. 115 (Williams and Wilkins, Baltimore, 1937).

³ Meyer, Karl, *et al.*, Cold Spring Harbor Symposia on Quantitative Biology, 6 (in the Press).

Production of Mammary Carcinomas in Mice of a Susceptible Strain by the Synthetic Oestrogen, Triphenyl Ethylene

It is well known that in certain inbred strains of mice, many of the females develop spontaneous mammary tumours. Few or no tumours occur in the males of these strains or in the females spayed before puberty. When, however, these males are injected with oestrone over prolonged periods, a number develop mammary tumours.

We have produced mammary carcinomas in the males of such a strain by the injection of a synthetic oestrogen. Fifty-three males of the *R* III strain (Dobrovolskaia-Zavadskaia) received weekly a subcutaneous injection of 5 mgm. of triphenyl ethylene in oil, the dose being later reduced to 3 mgm. The injections were started before the age of sexual maturity and have been continued up to the present time. Twenty-six mice are still alive after 28 or more weeks of treatment.

So far, ten mammary carcinomas have developed in nine male mice (one mouse developed two tumours). They are of the same histological type as those which occur spontaneously or which are produced by the injection of a natural oestrogen in this strain; that is, they are papillary adenocarcinomas with cystic and degenerative areas. The tumours appeared at 18, 19½, 21 (two mice), 23, 24 (two mice), 26 and 29 weeks of treatment.

Several tumours have also developed in females of the same strain ovariectomized before puberty and afterwards injected with triphenyl ethylene. Their histological examination is at present in progress.

Twenty-nine males and twenty-one females (non-spayed) of a strain which does not spontaneously develop mammary carcinoma (black agouti) have also been injected with triphenyl ethylene for a similar period, and no tumours have so far developed.

J. M. ROBSON.

Dept. of Pharmacology,
University of Edinburgh.

G. M. BONSER.

Dept. of Experimental Pathology,
University of Leeds.
Oct. 3.

A Hæmoglobin from Bile Pigment

UNDER this title, Lemberg, Legge and Lockwood have described in NATURE of July 23, p. 148, "a new hybrid hæmoglobin" formed by special treatment of hæmoglobin - ascorbic acid solutions. In the summary given, p. 166, one finds the following: "The new compound, like hæmoglobin, combines reversibly with oxygen and carbon monoxide, but the non-protein part of its molecule is a bile pigment closely related to verdohæmatin." This might give the impression that the existence of bile pigment-globin compounds was not known before.

In 1932, Barkan¹ suggested that the 'easily split off' blood iron ("leicht abspaltbares" Bluteisen), discovered in 1925 by him², may be a step in the formation of bilirubin. Later Barkan and Schales³ pointed out that the two fractions *E* and *E'* of the 'easily split off' blood iron accompany the hæmoglobin in the circulating blood as intermediate products of bilirubin formation. *E* and *E'* are hæmoglobin-like compounds in which the bearer is an undenaturated globin, whilst the prosthetic group is a hæmin or hæm derivative with an opened porphyrin ring similar to that in Lemberg's 'verdohæmochromogen'. We called these compounds 'pseudohæmoglobins', and the prosthetic groups 'pseudohæmin' and 'pseudohæm'. We suggested the use of the prefix 'pseudo-' for such products which resemble in many points the 'true' ones and differ from them only by the opening of the porphyrin ring, indicating by the letter α , β , etc., at which methene group the opening took place (in our case α -pseudohæmoglobin, α -pseudohæm, etc.). We were able to show³ that the two native fractions *E* and *E'* differ by the valence of the iron. It is in the divalent form in *E* (*E* is a pseudohæmoglobin *in sensu strictiori*), but trivalent in *E'* (*E'* is a pseudomethæmoglobin). We were able to transform *E* into *E'* and vice versa³. Barkan and co-workers described many properties of the pseudohæmoglobins *E* and *E'*. The most important fact is that the bile pigment - globin compound *E* combines reversibly with oxygen and carbon monoxide according to the 'distribution equation', and that the relative carbon monoxide affinity (by which is meant the ratio of the affinity for carbon monoxide to that for oxygen) is rather greater in the case of *E* compared with hæmoglobin (Barkan and Berger⁴). The pseudomethæmoglobin *E'* (like the methæmoglobin) does not react in this way with oxygen and carbon monoxide.

Recently Lemberg observed that verdohæm (pseudohæm after our definition) unites with native globin to give a hæmochromogen and not a hæmoglobin. Therefore he assumed as a working hypothesis that in the disintegration of hæmoglobin the alteration of the globin part precedes the oxidation of the prosthetic group⁵. Barkan and Schales⁶, on the other hand, have emphasized that the existence of *E* and *E'* (that is, of iron containing bile pigment - globin compounds) in the normal red blood cells gives evidence that an oxidation of the prosthetic group must be the first step in the breakdown of hæmoglobin. The new statement by Lemberg and his co-workers that an iron containing bile pigment - globin compound is readily formed from hæmoglobin seems, when considered in connexion with our previous work, to support our opinion mentioned above.

There is no evidence, however, indicating whether or not the new hæmoglobin product of Lemberg and co-workers is identical with our pseudohæmoglobin