A fourth group of normal infants was fed almond flour. Fifteen to fifty grams were added to the daily feedings. Fifteen infants were tested and of this number two showed positive skin tests. These appeared seventeen and twenty-three days after the first feeding. In both cases precipitin was present prior to the skin reactions.

These results indicate that the enteral absorption of antigenic protein by normal or marasmic infants leads not only to the appearance of a specific precipitin in the blood, but also in many cases to cutaneous hypersensitiveness. The results also indicate that there is a definite coincidence between the appearance of the skin reaction and the presence of precipitin in the blood.

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The intestinal absorption of antigenic protein by normal infants.

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In previous communications,[1] it has been shown that the blood of most marasmic infants contains precipitin for cow's milk at some period of the disease, indicating preceding enteral absorption of antigenic protein from cow's milk.

Supported by a large number of observations, it is generally assumed that in the process of normal digestion no antigenic protein product enters the blood. In a few isolated experiments, which involved feeding large amounts of protein at a single dose, absorption of antigenic protein by normal individuals has been demonstrated by Ascoli, Schloss and Worthen, and others. Most investigations of this type, however, have been negative. In a large number of normal infants, tests for precipitin for cow's milk made by us, have been uniformly negative.

[1] Schloss, O. M., and Anderson, A. F., Allergy to Cow's Milk in Infants with Severe Malnutrition, PROC. SOC. EXP. BIOL. AND MED., 1922, xx, 5; Anderson, A. F., and Schloss, O. M., Allergy to Cow's Milk in Infants with Nutritional Disorders, *Am. J. Dis. Child.*, 1923, xxvi, 451.

The fact that precipitin for cow's milk may be present in the blood of marasmic infants for a time but later disappear, despite the continued ingestion of cow's milk, suggested that perhaps a similar process may occur with normal infants. If this were true, normal infants might absorb antigenic protein in amounts sufficient to provoke the production of precipitin for a short time only, in which event negative precipitin tests would not prove that antigenic protein were not absorbed at some previous time. It therefore seemed desirable to observe normal infants whose food contained proteins which they had not ingested before, and to determine whether sufficient antigenic protein was absorbed from the intestinal tract to cause the appearance of specific precipitin. Pursuant of this, observations were conducted on normal infants who received egg white, sheep serum and almond in their food. We have had opportunity also to observe normal infants who received cow's milk for the first time.

The proteins were fed in the following fashion. Six to 12 grams of powdered egg white, 30 to 60 cc. of sheep serum or 15 to 30 grams of almond meal were added to the day's food. The infants received, therefore, a relatively low concentration of the added protein. Precipitin tests on the blood of each patient were made before the special proteins were added to the food, and afterwards, at approximately 72 hour intervals. The precipitin tests were conducted by adding from .1 to .2 cc. of the patients' serum to dilutions of the protein in concentrations from 1 :100 to 1 :5,000. The concentrations were varied somewhat with different proteins. The usual controls were carried out routinely.

Thirteen normal infants were fed egg white in the quantities mentioned. All of these infants developed precipitin for egg white. In 10 instances the precipitin appeared 9 to 14 days after the addition of egg to the food. In the other 3 cases, it appeared 28, 30 and 40 days after egg was first ingested.

The results from feeding sheep serum were practically identical. The three infants in this group showed precipitin to sheep serum 8, 13 and 19 days respectively after sheep serum was first ingested.

Twelve infants or young children from 10 months to 3 years of age were fed almond meal. Nine developed precipitin to amandin—the globulin of almond—from 9 to 15 days after the special feeding was begun.

Of special interest is a group of 9 infants who were observed when they began to ingest cow's milk. They had previously received human milk exclusively and were either abruptly weaned or were given one or more feedings of cow's milk in addition to human milk. All of these infants developed precipitin for cow's milk at intervals of 17, 12, 16, 13, 25, 15, 10, 8 and 12 days respectively, after the ingestion of cow's milk was commenced.

It is significant that in most of these observations the precipitin appeared promptly, usually in about two weeks. It was of interest also that the degree of precipitin formation was relatively slight and that the precipitin could be demonstrated in the blood for a comparatively short period only.

The phenomenon of precipitin formation which we have observed in normal infants is strikingly different from that observed in marasmic infants. In the latter, the continued ingestion of cow's milk may fail to provoke the production of precipitin until the lapse of many weeks; while in normal infants precipitin appears very promptly after the first ingestion of cow's milk. Furthermore, the degree of precipitin formation in marasmic infants is much more marked than in normal infants, indicating an absorption of relatively larger amounts of antigenic protein. Finally, judging by the duration of precipitin in the blood, marasmic infants absorb antigenic protein from the intestinal tract over a much longer period of time than do normal infants.

These observations demonstrate that when normal infants ingest cow's milk, egg albumin, sheep serum or almond for the first time, sufficient protein is absorbed in antigenic form to provoke the production of specific precipitin in the blood. The early disappearance of the precipitin would seem to indicate that such absorption is of relatively short duration. A consideration of the exact mechanism involved in the absorption of antigenic protein and the cessation of such absorption, would be largely speculative and therefore out of place at this time.