This phenomenon was not observed in any other mating type, or in all mating types taken together. The reverse comparison—the sex ratio before and after a male birth—yielded no such significant effect.

The 'completely typed' families published, in birth order, by other research workers, have not been analysed as yet because they contain omissions and do not indicate where children were not available for testing. Such omissions are irrelevant, of course, for the purposes for which those families were studied, but the omission of an eldest daughter from the available record would seriously affect the present analysis.

The sex ratio for the entire series was quite high. This was true whether the total progeny, or only the present child, were considered. Attempts to compare the observed ratio with other figures on the proportion of males and females among new-borns have indicated that the standard figure of 106 males to 100 females, which is quoted in at least one recent text-book on human genetics, is not applicable to this region of the United States.

Further investigations on the epidemiology of the sex ratio, with respect both to this blood group system and to other factors, are planned. This work was supported by grants *GM* 10474 and *A* 2901 from the National Institutes of Health.

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PATHOLOGY

Copper Content of Hair in Kwashiorkor

KWASHIORKOR is a protein malnutrition syndrome frequently found in underdeveloped countries. The level of copper in the serum of people with kwashiorkor has been shown to be greatly reduced[1–3]; and it has been suggested that changes in the colour and texture of hair, which are characteristic of the disease, might be associated with an altered copper content. Gopalan[1] found that the copper content of the hair of Indian children with kwashiorkor was considerably less than that of healthy children. Such a reduction might provide a means of early diagnosis. The work described here was undertaken to see whether the reduction is found in other cases of kwashiorkor. Samples of hair were obtained from 13 East African children, 10 with kwashiorkor diagnosed at the Mulago Hospital, Kampala, Uganda, and three healthy controls. The copper content of the hair was measured and the results compared with normal values[1,4].

The samples, which were uniform in colour and texture, had been stored in dry conditions for several months. The hair was washed, defatted and dried at 70° to constant weight before analysis.

Copper was estimated with oxalyldihydrazide by Rice's method[5]. Portions of hair (0·5–2 g) were dry-ashed overnight in covered silica crucibles at 540°–580° in a muffle furnace. The ash was taken up in 1 ml. reagent (0·1 per cent w/v oxalyldihydrazide in 2 N hydrochloric acid) and the crucible rinsed with 1 ml. water. The combined extract and wash was centrifuged at 3,000*g* for 15 min. To the clear supernatant was added 0·5 ml. ammonia solution (sp. gr. 0·88) followed by 0·5 ml. acetaldehyde solution (50 per cent v/v in water). After 30 min at room temperature the absorption was measured against a reagent blank containing EDTA in cells of 1 cm light path at 542 mμ. Precautions were taken to ensure that all apparatus and reagents were free of copper, and deionized water was used throughout. When measured against an EDTA blank, reagent blanks always gave low extinction values indicating negligible copper contamination. There was a 90 per cent recovery of copper (5–10 μg) added to the ashing stage. No correlation was found between the amount of copper estimated and the quantity of residue removed by centrifugation. The copper content of the hair was calculated from at least four separate analyses of each sample.

The results are shown in Table 1.

Table 1. COPPER CONTENT (MEAN VALUES WITH STANDARD DEVIATION) OF THE HAIR OF HEALTHY CHILDREN AND CHILDREN WITH KWASHIORKOR

Classification	Sample No.	Hair colour	Age	Copper content of hair μg/g dry defatted hair
Healthy	1	Black	4 y	8·2 ± 0·4
	2	Black	5 y	9·2 ± 0·3
	3	Black	3 y	9·3 ± 0·2
Kwashiorkor	1	Dark brown	2 y	10·5 ± 2·0
	2	Fair	4 y	11·3 ± 0·2
	3	Dark brown	1 y 8 m	12·6 ± 0·5
	4	Fair	Not known	14·0 ± 0·7
	5	Dark brown	1 y 10 m	14·2 ± 1·5
	6	Fair	Not known	14·9
	7	Fair	Not known	15·8 ± 1·4
	8	Dark brown	Not known	17·1 ± 0·4
	9	Dark brown	Not known	26·8 ± 0·2
	10	Black	Not known	26·9 ± 0·7

In agreement with the results of Gopalan[1] on kwashiorkor and of Gos and Green[4] on pigmentation in man and various animal species, no correlation was found between hair colour and copper content. The average copper content of the kwashiorkor group is 16·4 ± 2·0 μg/g. This is similar to normal values found by Goss and Green (15, 18 μg/g) and by Gopalan (19·3 ± 1·23 μg/g). The average of the small healthy control group (8·9 ± 0·1 μg/g) is surprisingly low.

These findings show that kwashiorkor is not necessarily accompanied by a reduction in the copper content of hair.

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Effect of *N*-methyl *N*-nitroso Urethane on Amoebae

N-METHYL *N*-nitroso urethane (MNU) is a potent carcinogen which produces tumours in rats and mice after a few or even single doses[1–4]. The possibility that experiments using single cells might give some indication of site and mode of action within the cell led to the following investigation of the effects of MNU on the large free-living mononucleate amoeba, *Amoeba proteus*. These unicellular animals are particularly useful for such studies[5–7], as they can be grown singly (the fate of each treated amoeba can be followed and studies made on clones arising from them) and they survive well after micrurgy, for example, transfer of nucleus from one individual to another[8].

Treatment in these experiments consisted of exposure of amoebae to solutions of MNU for varying times. After exposure to MNU amoebae were cultured singly in small glass dishes until they either died or divided to form clones of 250 or more animals. The effect of the compound was