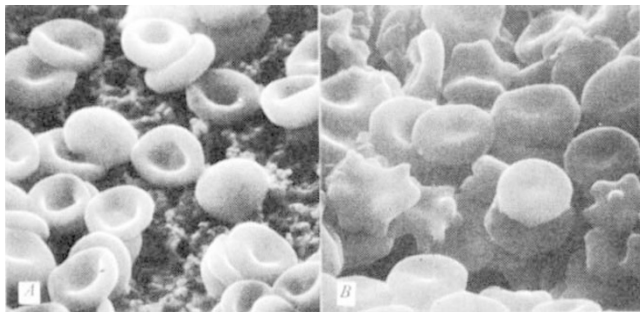

Fig. 1 Scanning electron micrographs of erythrocytes. *A*, Normal mouse; *B*, dystrophic mouse, strain 129/ReJ-dy. In both instances magnification is 2,500-fold.

indeed widely distributed in the tissues of the organism, then it is likely that it should be sought in tissues other than muscle, as the characteristic degeneration of muscle renders judgments about membrane function virtually impossible.

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P. F. MORSE
J. L. HOWLAND

Committee on Biochemistry and Department of Biology, Bowdoin College, Brunswick, Maine 04011

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Odour-Blindness to Musk: Simple Recessive Inheritance

Whissell-Buechy and Amoore[1] have reported specific anosmia in humans to two substances, iso-valeric acid and a musk (pentadecalactone), anosmia to the second being inherited as a recessive. They found a difference of incidence in both anosmias between Black and Caucasian subjects.

This work raises several points of biological interest as both iso-valeric acid and musks are candidates for consideration as functional pheromones, the former in monkeys[2,3], and both of them in man[4]. It is also believed that some components of olfactory response to musk odours (exaltolide[5,6] and Δ^{16}-androstenone or "boar odour"[7]) are hormone-dependent, being markedly increased by oestrogens. Exaltolide perception in women has been said to vary with the menstrual cycle[6].

Whissell-Buechy and Amoore's sample consisted, for pentadecalactone, of 218 parents and 266 children ranging in age from 5 to 18 yr. These results were not broken down by sex and puberty, but of fifteen anosmic parents cited in their figure, ten were women and five were men, assuming the convention that circle symbols represent females. The object of Amoore's study is to use genetic and chemical mapping to investigate primary odour response. On the crude data, and accepting the idea of menstrual variation, it could be that the genetic effect identified in the case of pentadecalactone is an unusually high degree of oestrogen dependence rather than a primary anosmia.

I suggest that in future studies involving potential pheromones it would be interesting to follow anosmic female subjects throughout a complete menstrual cycle and anosmic children through puberty. Anosmia for iso-valeric acid would not be expected to have in man the effects on sexual performance which it might have in monkeys[2], but any anosmia, whether total or cyclical, affecting potential pheromones is of special interest. It would also be desirable to look for evidence of androgen effects upon the ability to detect, or upon the nature of the subjective response to, vaginal fatty acids, and to re-examine Whissell-Buechy and Amoore's data by age, sex, and the ingestion of hormones, particularly oral contraceptives, as well as by menstrual date. It is known that the perception of taste and odour stimuli can be profoundly affected by, for example, pregnancy, at the level of subjective response rather than of threshold.

ALEX COMFORT

Department of Zoology, University College, London WC1

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Drs Whissell-Buechy and Amoore reply: We are glad that Dr Comfort[1] has pointed out some wider biological significance of the variations in odour sensitivity that we have described[2]. Many of his suggestions for future study are included in new research that we have just begun. At present we merely wish to counter his argument that our observed distribution of pentadecalactone anosmia in families could possibly have been due to a menstrual variation in sensitivity of females, rather than having a recessive genetic basis as we believe.

It should be borne in mind that about half our subjects were male, and that a good proportion of the females were either prepubertal or postmenopausal. Therefore, it is difficult to see how any reported menstrual cyclic changes in musk sensitivity[3] could account for our results, except in those few of our families where the incidence of anosmia was limited to nubile females. Although eleven mothers and only six fathers were musk anosmics, the difference is not significant. We should also mention that the eighty-four unrelated adult non-anosmic subjects in Fig. 1 of our paper[2] included fifty-two men and thirty-two women, but the mean thresholds of the two groups to pentadecalactone were not significantly different. This confirms an earlier report by one of us[4]. It means that our family trees cannot even be ascribed to any supposed systematic difference between the sexes as regards sensitivity to musk.

We raise this point because it conflicts with Le Magnen's[5] widely-quoted assertion that men, boys, and prepubertal girls are much less sensitive than adult women to the odour of pentadecalactone musk. We find that young boys and girls (5–11 yr) also can undoubtedly smell this compound, unless they happen to be among the 8–10% having this specific anosmia, which is equally likely to affect their seniors. We are in the course of gathering additional quantitative data on this interesting topic. Meanwhile we continue to believe that a