

portion of red muscle. Next come mackerel and herring, which also move rapidly in shoals. On the other hand, halibut, as a flat fish, has less and a paler red muscle. Further considerations along these lines give the same general relation between activity and the extension and pigmentation of the red muscle in different species.

A fuller account of this work will be published later.

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¹ Brækkan, O. R., Report on Technological Research concerning the Norwegian Fish Industry, 3, No. 3 (in the press).

² Hamoir, G., *Nature*, 171, 345 (1953). Jebsen, J., *Årsberetning vedkommende Norges Fiskerier*, No. 3 (1954). Matsuura, F., Konosu, S., Ota, R., Katori, S., and Tanaka, K., *Bull. Jap. Soc. Sci. Fish.*, 20, 941 (1955).

³ Matsuura, F., and Hashimoto, K., *Bull. Jap. Soc. Sci. Fish.*, 20, 946 (1955). Matsuura, F., Yamada, S., and Hashimoto, K., *ibid.*, 20, 950 (1955).

Production of Haploid Plants of Marrow-stem Kale

HAPLOID maize plants have been obtained in frequencies varying between 0.02 and 0.3 per cent by examining seedlings from plants, homozygous for recessive seedling-colour marker genes, which have been pollinated by plants homozygous for dominant marker genes¹. In marrow-stem kale (*Brassica oleracea* L. var. *acephala* D.C.), it has been found that non-hairy first leaf is recessive to hairy first leaf. Five plants, homozygous for the recessive gene, non-hairy, and obtained from inbreeding a single selection (plant 220), were pollinated in the bud stage by a single plant (31/11), which was homozygous for the dominant gene for hairy first leaf and which was also a first-generation inbred plant. As is shown in Table 1, a total of 2,674 seedling plants were examined and four non-hairy plants were found.

Table 1

Female parent	Male parent	No. seed sown	No. germ.	Per cent germ.	No. hairy	No. non-hairy	No. haploids
220/2	31/11	285	289	95	289	—	—
220/4	31/11	474	295	62	295	—	—
220/6	31/11	240	233	99	237	1	—
220/9	31/11	952	885	93	884	1	1
220/12	31/11	1,006	987	98	985	2	1
Total		2,957	2,674		2,670	4	2

When these four non-hairy plants came into flower, three had sterile pollen and two of these had much smaller flowers than normal diploid kale. Measurements of stomata showed that the two with small flowers also had relatively small stomata, 22 μ and 23 μ long, as compared with 28 μ long in normal diploid plants.

Cytological examination of pollen mother cells confirmed that the two plants were haploids with a chromosome number of $2n = 9$. A preliminary examination of fifty-four cells at first metaphase showed thirty-eight cells with no bivalents, twelve with one and four with two. The presence of these bivalents is interesting since it has been suggested from the occurrence of secondary pairing of bivalents that the true basic number in the genus *Brassica* is 6, and that in *B. oleracea* itself "three of the six basic chromosomes are present in duplicate, the other three but once each"². The bivalent frequency

would also appear to be higher than that in haploid *Brassica campestris* ($2n = 10$), where only occasional cells with one loosely paired bivalent were seen³.

The occurrence of the two non-hairy plants, which are not haploids, may be due either to accidental self-pollination, diploid egg cells of the female parent functioning without fertilization, spontaneous doubling of original haploid embryos, or mutations in the pollen of the male parent. It may be possible to show that the last hypothesis is the correct explanation by determination of the self-incompatibility allelomorphs present in the two diploid non-hairy plants.

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¹ Chase, S. S., "Heterosis", edit. Gowen, Chapter 25 (Iowa State College Press, 1952).

² Catcheside, D. G., *Cytologia*, Fujii Jub. Vol. 366 (1937).

³ Ramanujam, S., *Proc. Ind. Acad. Sci.*, B, 14, 25 (1941).

Epidiopatra hupferiana Augener from the North-East Pacific

THE little-known polychaete genus *Epidiopatra*, belonging to the family Eunicidae, was set up by Augener¹ in 1918 to contain two species, *E. hupferiana* and *E. drewinensis*, both collected off the west coast of Africa. No other species has since been added to the genus. The only subsequent record of either species is that of *E. hupferiana* from South Africa by Monro² in 1930. Both Augener's and Monro's specimens were dredged on muddy or sandy bottoms and, in Augener's case, mention is made of their inhabiting tubes.

Capture of a specimen of *E. hupferiana* in a plankton tow, from 100 ft. to surface, in Hecate Strait, British Columbia, seems worthy of record. It was taken by Mr. R. J. LeBrasseur, of this Station, in June 1955. The specimen is small (about 12 mm. long); but the characters are unmistakable. The generic characters are essentially those of the better-known Eunicid genus *Diopatra*, except that tentacular cirri are entirely absent and there is a very limited number of branchiferous segments. In all technical details the specimen agrees completely with Augener's and Monro's descriptions of *E. hupferiana*.

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¹ Augener, H., "Beiträge zur Kenntnis des Meeresfaunas West-Afrikas", 2, Pt. 2, 355 (1918).

² Monro, C. C. A., *Discovery Reports*, 2, 125 (1930).

Two Unifactorial Characters for which Man is Polymorphic

IT has been recognized for many years that humans excrete methanethiol (methyl mercaptan) after eating asparagus, and it has been assumed that this character is universal^{1,2}. We have found, however, that while some subjects excrete detectable amounts of methanethiol after ingesting only three or four sticks of asparagus, no significant amount of the compound appears in the urine of others after ingestion of as much as a pound of asparagus. Biochemical investigations of this metabolic difference are being made in collaboration with Dr. P. W. Kent. Nencki's³

Table 1

Parental phenotypes	Families tested	Children		Total
		Excretors	Non-excretors	
Exc. × exc.	1	1	1	2
Exc. × non-exc.	4	5	7	12
Non-exc. × non-exc.	4	0	11	11

identification of the odorous substance in urine as methanethiol has been confirmed by isolation of the corresponding silver mercaptide.

In a random sample of 115 individuals, forty-six were found to be excretors of methanethiol after eating asparagus and sixty-nine were found to be non-excretors. Limited familial data suggest that the excretor character is controlled by a single, autosomal, dominant gene. The offspring of different mating types are summarized in Table 1.

The second character which we have investigated is the appearance of a distinct red coloration in the urine after eating moderate quantities of beetroot. This has been regarded as a rare anomaly occasionally confused with haematuria in medical practice. However, in a random sample of 104 subjects, ten reported that they were distinctly positive for this character; another small survey brought to light four matings in which both partners were positive. The six children of these matings are all positive; this result would occur by chance less than once in a million times, and it therefore suggests strongly that the character is controlled by a single, autosomal, recessive gene. Other family data, which accord with this interpretation, are included in Table 2.

The order of frequency of this character implies that about 43 per cent of the population are heterozygous for the gene; hence the expected proportion of non-excretors to excretors in the progeny of cross-matings is just over 3:1. As it happened, in both the families tested the non-excretor parent was known to be heterozygous for the gene and the 1:1 ratio expected in such back-crosses was obtained. However, the expression of this character appears to be somewhat variable. Most positive subjects develop a typical red urinary pigmentation whenever they eat beetroot; but in a minority the red pigment appears only intermittently, sometimes being replaced by a dark-brown pigment. The red pigment in urine has the same absorption spectrum as the water-soluble beet pigment, betanin, described by Pucher and colleagues³, which appears to be a polyhydroxyphenolic glucoside containing two atoms of nitrogen per molecule. The brown pigment sometimes found in urine may represent a decomposition product of this rather unstable compound. Dr. R. B. Fisher kindly allows us to quote his finding that the beet pigment is readily absorbed in isolated rat intestines. If betanin is absorbed in all human subjects, its appearance in the urine of about 10 per cent presumably reflects an inability on their part to metabolize the compound. When tested, two excretors of betanin showed no difference from other subjects in glucose re-absorption in the renal tubules.

Table 2

Parental phenotypes	Families tested	Children		Total
		Excretors	Non-excretors	
Exc. × exc.	3	6	0	6
Exc. × non-exc.	2	2	2	4
Non-exc. × non-exc.	6	2	14	16

It seems that both these characters fall within Ford's definition of polymorphism: "The occurrence together in the same habitat of two or more distinct forms of a species in such proportions that the rarest of them cannot be maintained by recurrent mutation"⁴. If our interpretation of the genetics is correct, in the samples quoted the frequency of the gene controlling methanethiol excretion after eating asparagus, which we propose naming *As*, is 0.23, and the frequency of the gene controlling excretion of beet pigment, for which we propose the symbol *bt*, is 0.31. The fact that these genes and their allelomorphs have remained common in human populations suggests that they are being, or have been, maintained in equilibrium by selective forces which confer an advantage on the heterozygotes. The nature of these forces is at present unknown; but it is possible that, as has already been shown in some blood-groups and haemoglobin variants⁵, the various genotypes differ in respect of susceptibility to disease.

These unifactorial characters identify two additional loci on human chromosomes and should prove of value in tests of genetic linkage.

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¹ Nencki, M., *Arch. Exp. Path. und Pharm.*, **23**, 206 (1891).

² West, E. J., and Todd, W. R., "Textbook of Biochemistry" (Macmillan, 1955).

³ Pucher, G. W., Curtis, L. C., and Vickery, H. B., *J. Biol. Chem.*, **123**, 61 (1938).

⁴ Ford, E. B., *Biol. Revs.*, **20**, 73 (1945).

⁵ Allison, A. C., *Cold Spring Harbor Symp. Quant. Biol.* (in the press).

Anopheles hyrcanus as a Vector of Filariasis in West Bengal

IN a recent epidemiological investigation of the filariasis problem in West Bengal, we have frequently detected the Indian form of the species *A. hyrcanus* var. *nigerrimus* as the vector of filariasis, like its counterpart, *A. hyrcanus* var. *sinensis*, in China and Dutch East Indies¹. It occurs throughout the entire zone from Narayanganj to Ramnagar, covering the four police areas of Belda, Egra, Contai and Ramnagar in the Midnapore District, excepting, however, a single occasion when bancroftian infection was noted in *Culex fatigans* from the suburbs of Contai. Finger blood of residents in every locality of this zone taken at night during the months February–April 1956 showed a mixed infection of microfilariae of both *Wuchereria bancrofti* and *Wuchereria malayi*, with the latter predominating.

It is generally known that filariasis in India caused by *W. bancrofti* is transmitted by *Culex fatigans*, whereas that caused by *W. malayi* is carried by *Mansonioides annulifera* and to a lesser degree by *M. uniformis* and a few other allied species². Among the anophelines found casually infected in Nature, mention may be made of *A. philippinensis*³; but never before has *A. hyrcanus* been incriminated as a natural carrier in India, although the species along with several other anophelines has long been known as a suitable intermediate host of the parasites under experimental conditions⁴.