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Restriction fragment length polymorphisms in Southern African populations and a search for linkage to tyrosinase-positive oculocutaneous albinism

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(Lander and Botstein, 1986). Conclusions from the present study would indicate that markers on chromosome 11 should be investigated, if the analysis of linkage between TPOCA and the HLA loci shows these loci not to be linked.

6.5 Conclusion

" The question of the hour now shifts from 'how do we get there or know when we are there?' to 'what can we learn once we have arrived?' "(Orkin, 1986).

The RFLPs reported here are found in populations that represent three major racial groups: the San, Negroids and Caucasoids. They are not confined to specific populations, although their allele frequencies differ, and are potentially useful as genetic markers in gene mapping, in medical applications and in anthropological studies. If the polymorphisms are not ideally suited to mapping the genome, they may further the understanding of genome organization.

A finding of clear relevance to the understanding of human evolution is the ubiquity of the polymorphisms. It would be premature to reach specific conclusions on the evolutionary factors involved, but as more population data on DNA polymorphisms are collated, some answers as well as other questions can be anticipated.

REFERENCES CITED

ADAMS J, ROTHMAN ED (1982). Estimation of phylogenetic relationships from DNA restriction patterns and selection of endonuclease cleavage sites. *Proc Natl Acad Sci USA* **79**:3560-3564.

ADAMS JW, KAUFMAN RE, KRETSCHMER PJ, HARRISON M, NIENHUIS AW (1980). A family of long reiterated DNA sequences, one copy of which is next to the human beta globin gene. *Nucleic Acids Res* **8**:6113-6128.

ALDRIDGE J, KUNKEL L, BRUNS G, TANTRAVAHI U, [illegible]NDE M, BREWSTER T, MOREAU E, WILSON M, BROMLEY W, RODERICK T, LATT S (1984). A strategy to reveal high-frequency RFLPs along the human X chromosome. *Amer J Hum Genet* **36**:546-564.

ALLERDICE PW, TEDESCO TA (1975). Localisation of human gene for galactose-1-phosphate-uridyltransferase. *Lancet* **ii**:39.

ALPER CA, JOHNSON AM (1969). Immunofixation electrophoresis: a technique for the study of protein polymorphism. *Vox Sang* **17**:445-452.

ANTONARAKIS SE, BOEHM CD, GIARDINA PJV, KAZAZIAN HH Jr (1982). Nonrandom association of polymorphic

restriction sites in the β-globin gene cluster. *Proc Natl Acad Sci USA* 79:137-141.

ANTONARAKIS SE, BOEHM CD, SERJEANT GR, THEISEN CE, DOVER GF, KAZAZIAN HH Jr (1984). Origin of the βˢ-globin gene in Blacks: The contribution of recurrent mutation or gene conversion or both. *Proc Natl Acad Sci USA* 81:853-856.

APKARIAN P, REITS D, SPEKREIJSE H, VAN DORP D (1983). A decisive electrophysiological test for human albinism. *Electroenceph Clin Neurophysiol* 55:513-531.

BAIRD KE (1970). Semantics and Afro-American liberation. *Social Casework* 50:265-269.

BALAZS I, PURELLO M, RUBINSTEIN P, ALHADEFF B, SINISCALCO M (1982). Highly polymorphic DNA site *D14S1* maps to the region of Birkitt lymphoma translocation and is closely linked to the heavy chain gamma1 immunoglobulin locus. *Proc Natl Acad Sci USA* 79:7395-7399.

BALAZS I, BAIRD MC, WEXLER K, WYMAN AR (1986). Characterization of the polymorphic DNA fragments detected with a new probe derived from the D14S1 locus. *Amer J Hum Genet* 39S:680A.

BAMEZAI R, HUSAIN SA, MISRA S, THACKER AK (1987). Cerebellar ataxia and total albinism. *Clin Genet* 31:178-181.

BARBER JI, TOWNSEND D, OLDS DP, KING RA (1984). Dopachrome Oxidoreductase: A new enzyme in the pigment pathway. *J Invest Dermatol* 83: 145-149.

BARINAGA M (1987). Critics denounce first genome map as premature. *Nature* 329:571.

BARKER D, WHITE R (1982). More base pair change polymorphisms at sites containing CpG. *Cytogenet Cell Genet* 32:253A.

BARKER D, SCHAFER M, WHITE R (1984). Restriction sites containing CpG show a higher frequency of polymorphism in human DNA. *Cell* 36:131-138.

BARNICOT NA (1952). Albinism in south-western Nigeria. *Ann Eugenics* 17:38-73.

BARNICOT NA (1953). Red hair in African Negroes: A preliminary study. *Ann Eugenics* 17:211-232.

BARON M (1976). Albinism and schizophreniform psychosis: A pedigree study. *Am J Psychiatry* 133:1070-1073.

BARSKI G, SORIEUL S, CORNEFERT F (1961). "Hybrid" type cells in combined cultures of two different mammalian cell strains. *J Natl Cancer Inst* 26:1269-1291.

BELL GI, PICTET R, RUTTER WJ (1980). Analysis of the regions flanking the human insulin gene and sequences of an Alu family member. *Nucleic Acids Res* 8:4091-4109.

BELL GI, KARAM JH, RUTTER WJ (1981). Polymorphic DNA region adjacent to the 5' end of the human insulin gene. *Proc Natl Acad Sci USA* 78:5759-5763.

BELL GI, SELBY MJ, RUTTER WJ (1982). The highly polymorphic region near the human insulin gene is composed of simple tandemly repeating sequences. *Nature* 295:31-41.

BELL GI, HORITA S, KARAM JH (1984). A polymorphic locus near the human insulin gene is associated with insulin-dependent diabetes mellitus. *Diabetes* 33:176-183.

BENEDICT WF, MURPHREE AL, BANERJEE A, SPINA CA, SPARKES MC, SPARKES RS (1983). Patient with chromosome 13 deletion: evidence that the retinoblastoma gene is a recessive cancer gene. *Science* 219:973-975.

BENTON WD, DAVIS RW (1977). Screening λgt recombinant clones by hybridization to single plaques *in situ*. *Science* **196**:180-182.

BIRD AP (1980). DNA methylation and the frequency of CpG in animal DNA. *Nucleic Acids Res* **8**:1499-1504.

BIRD AP (1986). CpG-rich islands and the function of DNA methylation. *Nature* 321:209-213.

BIRD AM, TAGGART M, FROMMER M, MILLER OJ, MACLEOD D (1985). A fraction of the mouse genome that is derived from islands of nonmethylated, CpG-rich DNA. *Cell* **40**:91-99.

BISHOP DT, CANNINGS C, SKOLNICK M, WILLIAMSON JA (1983). The number of polymorphic DNA clones required to map the human genome. In: *Statistical analysis of DNA sequence data*, Weir B (Ed), Marcel Dekker, New York pp 181-200.

BISHOP JO (1974). The gene numbers game. *Cell* 2:81-86.

BODMER WF (1981). Gene clusters, genome organisation, and complex phenotypes. When the sequence is known, what will it mean? *Amer J Hum Genet* 33:664-682.

BOONE C, CHEN TR, RUDDLE FH (1972). Assignment of three human genes to chromosomes (LDH-A to 11, TK to 17, and IDH to 20) and evidence for translocation between human and mouse chromosomes in somatic cell hybrids. *Proc Natl Acad Sci USA* 69:510-514.

BOTSTEIN D, WHITE RL, SKOLNICK M, DAVIS RW (1980). Construction of a genetic linkage map in man using restriction fragment length polymorphisms. *Amer J Hum Genet* 32:314-331.

BOWCOCK AM. Identification of restriction fragment length polymorphisms in southern African human populations. Ph.D. thesis, University of the Witwatersrand, Johannesburg 1984.

BOWCOCK AM, BUCCI C, HEBERT JM, KIDD JR, KIDD KK, FRIEDLAENDER JS, CAVALLI-SFORZA LL (1987). Study of 47 markers in five populations from four continents. *Gene Geography* 1:47-64.

BOYD WC (1950). *Genetics and races of man.* Little Brown, Boston.

BRUTLAG DL (1980). Molecular arrangement and evolution of heterochromatic DNA. *Ann Rev Genet* 14:121-144.

CAIRNS J (1963). The chromosome of *Escherichia coli*. *Cold Spring Harbor Symp Quant Biol* 28:43-46.

CAMERINO G, GRZESCHICK KH, JAYE M, DE LA SALLE H, TOLSTOSHEV P, LeCOCQ JP, HEILIG R, MANDEL JL (1984). Regional localization on the human X chromosome and polymorphism of the coagulation factor IX gene (hemophilia B locus). *Proc Natl Acad Sci USA* 81:498-502.

CANN RL, STONEKING M, WILSON AC (1987). Mitochondrial DNA and human evolution. *Nature* 325:31-36.

CANNINGS C, THOMPSON EA, SKOLNICK MH (1978). Probability functions on complex pedigrees. *Adv Appl Prob* 10:26-61.

CAPON DJ, CHEN EY, LEVINSON AD, SEEBURG PH, GOEDDEL DV (1983). Complete nucleotide sequences of the T24 human bladder carcinoma oncogene and its normal homologue. *Nature* 302:33-37.

CARLE GF, FRANK M, OLSON MV (1986). Electrophoretic separations of large DNA molecules by periodic inversion of the electric field. *Science* 232:65-68.

CARROLL MC, CAMPBELL RD, BENTLEY DR, PORTER RR (1984). A molecular map of the human major histocompatibility

complex class III region linking complement genes C4, C2 and factor B. *Nature* 307:237-241.

CASPERSSON T, ZECH L, JOHANNSSON C, MODEST EJ (1970). Identification of human chromosomes by DNA-binding fluorescent agents. *Chromosoma* 30:215-227.

CAVALLI-SFORZA LL, BODMER WF (1971). *The genetics of human populations.* WH Freeman and co, San Francisco, p41.

CAVALLI-SFORZA LL, EDWARDS AWF (1964). Analysis of human evolution. In: *Genetics Today, Proceedings of the XI International Congress of Genetics* 2:932.

CAVALLI-SFORZA LL, KIDD JR, KIDD KK, BUCCI C, BOWCOCK AM, HEWLETT BS, FRIEDLAENDER JS (1986). DNA markers and genetic variation in the human species. *Cold Spring Harbor Symp Quant Biol* LI:411-417.

CAVANEE W, LEACH R, MOHANDAS T, PEARSON P, WHITE R (1984). Isolation and regional localization of DNA segments revealing polymorphic loci from human chromosome 13. *Amer J Hum Genet* 36:10-34.

COLLINS FS, WEISSMAN SM (1984). Directional cloning of DNA fragments at a large distance from an initial

probe: A circularization method. *Proc Natl Acad Sci USA* **81**:6812-6816.

COLLINS J, HOHN B (1978). Cosmids: A type of plasmid gene-cloning vector that is packageable *in vitro* in bacteriophage heads. *Proc Natl Acad Sci USA* **75**:4242-4246.

COOPER DN (1983). Eukaryotic DNA methylation. *Hum Genet* **64**:315-333.

COOPER DN, SCHMIDTKE J (1984). DNA restriction fragment length polymorphisms and heterozygosity in the human genome. *Hum Genet* **66**:1-16.

COOPER DN, SMITH BA, COOKE HJ, NIEMANN S, SCHMIDTKE J (1985). An estimate of unique DNA sequence heterozygosity in the human genome. *Hum Genet* **69**:201-205.

COULONDRE C, MILLER JH, FARABAUGH PJ, GILBERT W (1978). Molecular basis of base substitution hotspots in *Escherichia coli*. *Nature* **274**:775-778.

COX DW, WOO SLC, MANSFIELD T (1985). DNA restriction fragments associated with α_1-antitrypsin indicate a single origin for deficiency allele PI Z. *Nature* ***316***:79-81.

CRAMER DV (1984). Biochemical loci of the rat (*Rattus norveticus*). In: O'Brien SJ (Ed) *Genetic Maps* III. Cold Spring Harbor Press, New York. pp 370-373.

CRAMPTON JM, DAVIES KE, KNAPP TF (1981). The occurrence of repetitive sequences in a library of cloned cDNA from human lymphocytes. *Nucleic Acids Res* 9:3821-3834.

CREAGAN RP, RUDDLE FH (1975). The clone panel: a systematic approach to gene mapping using interspecific somatic cell hybrids. *Cytogenet Cell Genet* 14:282-286.

CREEL D, WITKOP CJ, KING RA (1974). Asymmetric visually evoked potentials in human albinos: evidence for visual system anomalies. *Invest Ophthalmol* 13:430-440.

CREEL D, GARBER SR, KING RA, WITKOP CJ Jr (1980). Auditory brainstem anomalies in human albinos. *Science* 209:1253-1255.

CROUSE J, AMORESE D (1986). Stability of restriction endonucleases during extended digestions. In: *Focus*, Bethesda Research Laboratories 8(3):1-2.

DAVIDSON RL, EPHRUSSI B (1965). A selective system for the isolation of hybrids between *L* cells and normal cells. *Nature* 205:1170-1171.

DAVIES KE, YOUNG DD, ELLES RG, HILL MEE, WILLIAMSON RE (1981). Cloning of a representative genomic library of the human X chromosome after sorting by flow cytometry. *Nature* 293:374-376.

DAVIES KE, PEARSON PL, HARPER PS, MURRAY JM, O'BRIEN TO, SARFARAZI M, WILLIAMSON R (1983). Linkage analysis of two cloned DNA sequences flanking the Duchenne muscular dystrophy locus on the short arm of the human X chromosome. *Nucleic Acids Res* 11:2303-2312.

DEISSEROTH A, NIENHUIS A, TURNER P, VELEZ R, ANDERSON WF, RUDDLE F, LAWRENCE J, CREAGAN R, KUCHERLAPATI R (1977). Localization of the human α-globin structural gene to chromosome 16 in somatic cell hybrids by molecular hybridization assay. *Cell* 12:205-218.

DEISSEROTH A, NIENHUIS A, LAWRENCE J, GILES, TURNER P, RUDDLE FH (1978). Chromosomal localization of human β-globin gene on human chromosome 11 in somatic cell hybrids. *Proc Natl Acad Sci USA* 75:1456-1460.

DE LA CHAPELLE A (1985). The human gene map in 1985. Eighth international workshop in human gene mapping. *Cytogenet Cell Genetic* **40**:1-7.

DE LE CHAPELLE A, ERICKSSON AW, KIRJARINTA M, KNUTAR F (1971). Glutathione reductase activity in haematological disorders associated with C trisomy. *Eur J Clin Invest* 1:366 (abstract).

DENARO M, BLANC H, JOHNSON MJ, CHEN KH, WILMSEN E, CAVALLI-SFORZA LL, WALLACE DC (1981). Ethnic variation in *Hpa* I endonuclease cleavage patterns of human mitochondrial DNA. *Proc Natl Acad Sci USA* **78**:5768-5772.

DOGLIOTTI M (1973). Actinic keratoses in Bantu albinos. Clinical experiences with the topical use of 5-fluoro-uracil. *S Afr Med J* **47**:2169-2172.

DONAHUE RP, BIAS WB, RENWICK JH, McKUSICK VA (1968). Probable assignment of the Duffy blood group locus to chromosome 1 in man. *Proc Natl Acad Sci USA* **61**:949-955.

DONIS-KELLER H and CO-AUTHORS (1987). A genetic linkage map of the human genome. *Cell* 51:319-337.

DONLON TA (1986). Practical approaches to in situ hybridization. *Karyogram* 12:3-10.

DONLON TA, LITT M, NEWCOM SR, MAGENIS RE (1983). Localization of the restriction fragment length polymorphism *D14S1* (pAW-101) to chromosome 14q32.1-32.2 by in situ hybridization. *Amer J Hum Genet* 35:1097-1106.

DONLON T, WYMAN AR, MULHOLLAND J, BARKER D, BRUNS G, LATT S, BOTSTEIN D (1986). Alpha satellite-like sequences at the centromere of chromosome #8. *Amer J Hum Genet* 39S:582A.

DOOLITTLE FW, SAPIENZA C (1980). Selfish genes, the phenotype paradigm and genome evolution. *Nature* 284:601-603.

DOS SANTOS MdRN. Gene assignment: interspecific somatic cell hybridization. M.Sc. thesis, University of the Witwatersrand, Johannesburg 1986.

DRAYNA D, WHITE R (1985). The genetic linkage map of the human X chromosome. *Science* 230:753-758.

DRIJA TP, RAPAPORT JM, WEICHSELBAUM R, BRUNS GAP (1984). Chromosome 13 restriction fragment length polymorphisms. *Hum Genet* 65:320-324.

DUNN DS, MADHOO B, TURNBULL R, JENKINS T (1986). Alpha-1-Antitrypsin variation in Southern Africa. *Hum Hered* 36:238-242.

EDWARDS AWF, CAVALLI-SFORZA LL (1972). Affinity as revealed by differences in gene frequencies. In: Weiner JS, Huizinga J (Eds). *The assessment of population affinities in man.* Clarendon Press, Oxford, pp37-47.

EGELAND JA, GERHARD DS, PAULS DL, SUSSEK JN, KIDD KK, ALLEN CR, HOSTETTER AM, HOUSMAN DE (1987). Bipolar affective disorders linked to DNA markers on chromosome 11. *Nature* 325:783-787.

ELSTON RC, LANGE K (1975). The prior probability of autosomal linkage. *Ann Hum Genet* 38:341-350.

ELSTON RC, STEWART J (1971). A general model for the analysis of pedigree data. *Hum Hered* 21:523-542.

ESTIVALL X, FARRALL M, SCAMBLER PJ, BELL GM, HAWLEY KMF, LENCH NJ, BATES GP, KRUYER HC, FREDERICK PA, STANIER P, WATSON EK, WILLIAMSON R, WAINWRIGHT BJ (1987). A candidate for the cystic fibrosis locus isolated by selection for methylation-free islands. *Nature* 326:840-845.

EWENS WJ, SPIELMAN RS, HARRIS H (1981). Estimation of genetic variation at the DNA level from restriction endonuclease data. *Proc Natl Acad Sci USA* 78:3748-3750.

FANNING TG (1983). Size and structure of the highly repetitive BAM H1 element in mice. *Nucleic Acids Res* 11:5073-5091.

FEARON ER, VOGELSTEIN B, FEINBERG AP (1984). Somatic deletion and duplication of genes on chromosome 11 in Wilms' tumour. *Nature* 309:176-178.

FOURNIER REK, RUDDLE FH (1977). Microcell-mediated transfer of murine chromosomes into mouse, Chinese hamster, and human somatic cells. *Proc Natl Acad Sci USA* 74:319-323.

FRITSCH EF, SHEN CKJ, LAWN RM, MANIATIS T (1980). The organization of repetitive sequences in mammalian globin gene clusters. *Cold Spring Harbor Symp Quant Biol* 45:761-775.

GALL JG, PARDUE ML (1969). Formation and detection of RNA.DNA hybrid molecules in cytological preparations. *Proc Natl Acad Sci USA* 63:378-383.

GARROD AE (1908). Inborn errors of metabolism [Lecture II p. 73]. *Lancet* ii:1-7.

GAUBATZ J, PRASHED N, CUTLER RG (1976). Ribosomal RNA gene dosage as a function of tissue and age for mouse and human. *Biochim Biophys Acta* 418:358-375.

GIBLETT ER (1969). *Genetic markers in human blood*. Blackwell Scientific Publications, Oxford and Edinburgh.

GILL P, JEFFREYS AJ, WERRETT DJ (1985). Forensic applications of DNA 'fingerprints'. *Nature* 318:577-579.

GITSCHIER J, WOOD WI, TUDDENHAM EGD, SHUMAN MA, GORALKA RM, CHEN EY, LAWN RM (1985). Detection and sequence of mutations in the factor VIII gene of haemophiliacs. *Nature* 315:427-430.

GOODE ME, VAN TUINEN P, LEDBETTER DH, DAIGER SP (1986). The anonymous polymorphic DNA clone D1S1, previously mapped to human chromosome 1p36 by in situ hybridization, is from chromosome 3 and is duplicated on chromosome 1. *Amer J Hum Genet* 38:437-446.

GOSS SJ, HARRIS H (1975). New method for mapping genes in human chromosomes. *Nature* 255:680-684.

GREINER AC, NICOLSON GA (1965). Schizophrenia-melanosis. Cause or side-effect? *Lancet* ii:1165-1167.

GRODZIDKER T, WILLIAMS J, SHARP P, SAMBROOK J (1974). Physical mapping of temperature-sensitive mutations of adenoviruses. *Cold Spring Harbor Symp Quant Biol* 39:439-446.

GUSELLA JF, KEYS C, VARSANYI-BREINER A, KAO F-T, JONES C, PUCK TT, HOUSMAN D (1980). Isolation and localization of DNA segments from specific human chromosomes. *Proc Natl Acad Sci USA* 77:2829-2833.

GUSELLA JF, WEXLER NS, CONNEALLY PM, NAYLOR SL, ANDERSON MA, TANZI RE, WATKINS PC, OTTINA K, WALLACE MR, SAKAGUCHI AY, YOUNG AB, SHOULSON I, BONILLA E, MARTIN JB (1983). A polymorphic DNA marker genetically linked to Huntingdon's disease. *Nature* 306:234-238.

HARPER ME, SAUNDERS GF (1981). Localization of single copy DNA sequences on G-banded human chromosomes by in situ hybridization. *Chromosoma* 83:431-439.

HARPER ME, ULRICH A, SAUNDERS GF (1981). Localization of the human insulin gene to the distal end of the

short arm of chromosome 11. *Proc Natl Acad Sci USA* 78:4458-4460.

HARPER ME, BARRERA-SALDANHA HA, SAUNDERS GF (1982). Chromosomal localization of the human placental lactogen-growth hormone gene cluster to 17q22-24. *Amer J Hum Genet* 34:227-234.

HARRIS H, HOPKINSON DA (1972). Average heterozygosity per locus in man: an estimate based on the incidence of enzyme polymorphisms. *Ann Hum Genet* 36:9-20.

HARRIS H, HOPKINSON DA (1976). *Handbook of enzyme electrophoresis in human genetics*. North-Holland Publishing Company, Amsterdam.

HARRIS HE, WATKINS JF (1965). Hybrid cells derived from mouse and man: Artificial heterokaryons of mammalian cells from different species. *Nature* 205:640-646.

HARRISON GA (1973). Differences in human pigmentation: Measurement, geographic variation, and causes. *J Invest Dermatol* 60:418-426.

HATLEN L, ATTARDI G (1971). Proportion of the HeLa cell genome complementary to transfer RNA and 5 s RNA. *J Mol Biol* 56:535-553.

HAYNES SR, JELINEK WR (1981). Low molecular weight RNAs transcribed *in vitro* by RNA polymerase III from *Alu*-type dispersed repeats in Chinese hamster DNA are also found *in vivo*. *Proc Natl Acad Sci USA* 78:6130-6134.

HELENTJARIS T, GESTELAND R (1983). Evaluation of random cDNA clones as probes for human restriction fragment polymorphisms. *J Mol Appl Genet* 2:237-247.

HOLM T, O'CONNELL P, LEPPERT M, CALLAHAN P, LALOUEL J - M, WHITE R (1985). Parathyroid hormone and calcitonin are tightly linked and have been placed on the genetic map of chromosome 11p. *Cytogenet Cell Genet* 40:653-654 (abstract).

HOUCK CM, REINEHART FP, SCHMID CW (1979). A ubiquitous family of repeated DNA sequences in the human genome. *J Mol Biol* 132:289-306.

HU F, HANIFIN JM, PRESCOTT GH, TONGUE AC (1980). Yellow mutant albinism: Cytochemical, ultrastructural, and genetic characterization suggesting multiple allelism. *Amer J Hum Genet* 32:387-395.

HUMAN GENE MAPPING 8 (1985). Eighth International Workshop in Human Gene Mapping. *Cytogenet Cell Genet* 40 (1-4).

HWU HR, ROBERTS JW, DAVIDSON EH, BRITTEN RJ (1986). Insertion and/or deletion of many repeated DNA sequences in human and higher ape evolution. *Proc Natl Acad Sci USA* 83:3875-3879.

JAGADEESWARAN P, FORGET BG, WEISSMAN SM (1981). Short interspersed repetitive DNA elements in eukaryotes: transposable DNA elements generated by reverse transcription of RNA Pol III transcripts? *Cell* 26:141-142.

JEFFREYS AJ (1979). DNA sequence variants in the $G\gamma$ -, A γ-, δ- and β-globin genes of man. *Cell* 18:1-10.

JEFFREYS AJ, WILSON V, THEIN SL (1985a). Hypervariable 'minisatellite' regions in human DNA. *Nature* 314:67-73.

JEFFREYS AJ, WILSON V, THEIN SL (1985b). Individual-specific 'fingerprints' of human DNA. *Nature* 316:76-69.

JELINEK WR (1978). Inverted repeated DNA from Chinese hamster ovary cells studied with cloned DNA fragments. *Proc Natl Acad Sci USA* 75:2679-2683.

JENKINS T (1972). Genetic polymorphisms of man in southern Africa. M.D. Thesis, University of London 1972.

JENKINS T (1982). Human evolution in southern Africa. In: *Human Genetics, Part A: The Unfolding Genome*, Alan R Liss, Inc, New York, pp227-253.

JENKINS T, CORFIELD V (1972). The red-cell acid phosphatase polymorphism in Southern Africa: population data and studies on the R, RA and RB phenotypes. *Anal Hum Genet* 35:379-391.

JENKINS T, TOBIAS PV (1977). Nomenclature of population groups in Southern Africa. *African Studies* 36:49-55.

JENKINS T, ZOUTENDYK A, STEINBERG AG (1970). Gamma-globulin groups (Gm and Inv) of various southern African populations. *Am J Phys Anthrop* 32:197-218.

JENKINS T, HARPENDING HC, GORDON H, KERAAN MM, JOHNSTON S (1971). Red cell enzyme polymorphisms in the Khoisan peoples of Southern Africa. *Amer J Hum Genet* 23:5130532.

JOHNSON MJ, WALLACE DC, FERRIS SC, RATTAZZI MC, CAVALLI-SFORZA LL (1983). Radiation of human mitochondrial

DNA types analysed by restriction endonuclease cleavage patterns. *J Mol Evol* 19:255-271.

KAMARCK ME, BARKER PE, MILLER RL, RUDDLE FH (1984). Somatic cell hybrid mapping panels. *Exp Cell Res* 152:1-14.

KAN YW, DOZY AM (1980). Evolution of the hemoglobin S and C genes in world populations. *Science* 209:388-391.

KAO F-T, HARTZ JA, LAW ML, DAVIDSON JN (1982). Isolation and chromosomal localization of unique DNA sequences from a human genomic library. *Proc Natl Acad Sci USA* 79:865-869.

KEENE MA, ELGIN SC (1984). Patterns of DNA structural polymorphism and their evolutionary implications. *Cell* 36:121-129.

KEUPPERS F (1976). Determination of α_1-antitrypsin phenotypes by isoelectric focusing in polyacrylamide gels. *J Lab Clin Med* 88:151-155.

KING RA, OLDS DP (1985). Hairbulb tyrosinase activity in oculocutaneous albinism: Suggestions for pathway control and block location. *Amer J Med Genet* 20:49-55.

KING RA, WITKOP CJ Jr (1976). Hairbulb tyrosinase activity in oculocutaneous albinism. *Nature* 263:69-71.

KING RA, WITKOP CJ Jr (1977). Detection of heterozygotes for tyrosinase-negative oculocutaneous albinism by hairbulb tyrosinase assay. *Amer J Hum Genet* 29:164-168.

KING RA, OLDS DP, WITKOP CJ (1978). Characterization of human hairbulb tyrosinase: properties of normal and albino enzyme. *J Invest Dermatol* 71:136-139.

KING RA, CREEL D, CERVENKA J, OKORO AN, WITKOP CJ (1980). Albinism in Nigeria with delineation of new recessive oculocutaneous type. *Clin Genet* 17:259-270.

KITTUR SD, HOPPENAR JWM, ANTONARAKIS SE, DANIELS JDJ, MEYERS DA, MAESTRI NE, JANSEN M, KORNELUK RG, NELKIN BD, KAZAZIAN HH Jr (1985). Linkage map of the short arm of human chromosome 11: Location of the genes for catalase, calcitonin, and insulin-like growth factor II. *Proc Natl Acad Sci USA* 82:5064-5067.

KLOBUTCHER LA, RUDDLE FH (1981). Chromosome mediated gene transfer. *Ann Rev Biochem* 50:533-534.

KNOWLTON RG, COHEN-HAGUENAUER OC-, VAN CONG NV, FREZAL J, BROWN VA, BARKER D, BRAMAN JC, SCHUMM JW, TSUI L-C, BUCHWALD M, DONIS-KELLER H (1985). A polymorphic DNA marker linked to cystic fibrosis is located on chromosome 7. *Nature* 318:380-382.

KNOWLTON RG, BROWN VA, BRAMAN JC, BARKER D, SCHUMM JW, MURRAY C, TAKVORIAN T, RITZ J, DONIS-KELLER H (1986). Use of highly polymorphic DNA probes for genotypic analysis following bone marrow transplantation. *Blood* 2:378-385.

KORNER A, PAWELEK J (1982). Mammalian tyrosinase catalyzes three reactions in the biosynthesis of melanin. *Science* 217:1163-1165.

KOUFOS A, HANSEN MF, LAMPKIN VC, WORKMAN ML, COPELAND NG, JENKINS NA, CAVANEE W. (1984). Loss of alleles at loci on human chromosome 11 during genesis of Wilm's tumour. *Nature* 309:170-172.

KROMBERG JGR. A genetic and psychosocial study of albinism in southern Africa. PhD thesis. University of the Witwatersrand, Johannesburg, 1985.

KROMBERG JGR, JENKINS T (1982). Prevalence of albinism in the South African Negro. *S Afr Med J* 61:383-386.

KUCHERLAPATI RS, NICHOLS EA, CREAGAN RP, CHEN S, BORGAONKAR DS, RUDDLE FH (1974). Assignment of the gene for glutathione reductase to human chromosome 8 by somatic cell hybridization. *Amer J Hum Genet* 26:51A.

KUGELMAN TP, VAN SCOTT EJ (1961). Tyrosinase activity in melanocytes of human albinos. *J Invest Dermatol* 37:73-76.

KUNKEL LM, MONACO AP, MIDDLESWORTH W, OCHS HD, LATT SA (1985). Specific cloning of DNA fragments absent from the DNA of a male patient with an X chromosome deletion. *Proc Natl Acad Sci USA* 82:4778-4782.

KUNKEL LM AND CO-AUTHORS (1986). Analysis of deletions in DNA from patients with Becker and Duchenne muscular dystrophy. *Nature* 322:73-77.

KWON BS, HAQ AK, POMERANTZ SH, HALABAN R(1987). Isolation and sequence of a cDNA for human tyrosinase that maps at the mouse c-albino locus. *Proc Natl Acad Sci USA* 84:7473-7477.

LAM ST, STAHL MM, McMILIN KD, STAHL FW (1974). Rec-mediated recombinational hot spot activity in bacteriophage lambda II. A mutation which causes hot spot activity. *Genetics* 77:425-433.

LANDER ES, BOTSTEIN D (1986). Strategies for studying heterogeneous genetic traits in humans by using a linkage map of restriction fragment length polymorphisms. *Proc Natl Acad Sci USA* 83:7353-7357.

LANDER ES, BOTSTEIN D (1987). Homozygosity mapping: a way to map human recessive traits with the DNA of inbred children. *Science* 236:1567-1570.

LANGE K, BOEHNKE M (1982). How many polymorphic genes will it take to span the human genome? *Amer J Hum Genet* 34:842-845.

LATHROP GM, LALOUEL JM (1984). Easy calculations of LOD scores and genetic risks on small computers. *Amer J Hum Genet* 36:460-465.

LATHROP GM, LALOUEL JM, JULIER C, OTT J (1984). Strategies for multilocus linkage analysis in humans. *Proc Natl Acad Sci USA* 81:3443-3446.

LATHROP GM, LALOUEL JM, JULIER C, OTT J (1985). Multilocus linkage analysis in humans: Detection of linkage and estimation of recombination. *Amer J Hum Genet* 37:482-498.

LAWN RM, FRITSCH EF, PARKER RC, BLAKE G, MANIATIS T (1978). The isolation and characterization of linked δ- and β-globin genes from a cloned library of human DNA. *Cell* 15:1157-1174.

LEACH DRF, STAHL RW (1983). Viability of phages carrying a perfect palindrome in the absence of recombination nucleases. *Nature* 305:448-451.

LEACH R, DeMARS R, HASSTEDT S, WHITE R (1986). Construction of a map of the short arm of human chromosome 6. *Proc Natl Acad Sci USA* 83:3909-3913.

LEBO RV, CARRANO AV, BURKHART-SCHULTZ K, DOZY AM, YU L - C, KAN YW (1979). Assignment of human β-, γ- and δ- globin genes to the short arm of chromosome 11 by chromosome sorting and DNA restriction enzyme analysis. *Proc Natl Acad Sci USA* 76:5804-5808.

LEE TN, SINGER MF (1982). Structural organization of α-satellite DNA in a single monkey chromosome. *J Mol Biol* 161:323-342.

LEIBOWITZ MR, DOGLIOTTI M, HART G (1978). Schizophrenia and albinism. *Dermatologica* 156:367-370.

LEPPERT MF, CAVANEE W, CALLAHAN P, HOLM T, O'CONNELL P, THOMPSON K, LATHROP GM, LALOUEL J-M, WHITE R (1986).

A primary genetic map of chromosome 13q. *Amer J Hum Genet* 39:425-437.

LERNER AB, FITZPATRICK TB (1950). Biochemistry of melanin formation. *Physiol Rev* 30:91-126.

LIEBERMANN D, LIEBERMANN BH-. TROUTT AB, KEDES L, COHEN SN (1986). Sequences from sea urchin TU transposons are conserved among multiple eukaryotic species, including humans. *Mol Cell Biol* 6:218-226.

LITT M, WHITE RL (1985). A highly polymorphic locus in human DNA revealed by cosmid-derived probes. *Proc Natl Acad Sci USA* 82:6202-6210.

LITT M, BRUNS GA, SHEEHY R, MAGENIS RE (1986a). A highly polymorphic locus in human DNA revealed by probes from cosmid 1-5 maps to chromosome 2q3537. *Amer J Hum Genet* 38:288-296.

LITT M, SHEEHY R, BRUNS GA, MAGENIS RE (1986b). A polymorphic locus on the long arm of chromosome 20 defined by two probes from a single cosmid. *Hum Genet* 73:340-345.

LITTLEFIELD JW (1964). Selection of hybrids from mating of fibroblasts in vitro and their presumed recombinants. *Science* 145:709-710.

MAIO JJ, BROWN FL, McKENNA WG, MUSICH PR (1981). Toward a molecular paleontology of primate genomes. II. The KpnI family of alphoid DNAs. *Chromosoma* 83:127-144.

MALCOLM S, BARTON P, MURPHY C, FERGUSON-SMITH MA (1981). Chromosomal localization of a single copy gene by *in situ* hybridization-human β globin genes on the short arm of chromosome 11. *Ann Hum Genet* 45:135-141.

MANIATIS T, HARDISON RC, LACY E, LAUER J, O'CONNELL C, QUON D (1978). The isolation of structural genes from libraries of eukaryotic DNA. *Cell* 15:687-701.

MANIATIS T, FRITSCH EF, SAMBROOK J (1982). *Molecular cloning: a laboratory manual*. Cold Spring Harbor Laboratory, New York.

MARX KA, RUBEN GC (1983). Evidence for hydrated spermine-calf thymus DNA toruses organised by circumferential DNA wrapping. *Nucl Acids Res* 11:1839-1854.

MATTERSON KF, OSTRER H, CHAKRAVARTI A, BUETOW KH, O'BRIEN WE, BEAUDET AL, PHILLIPS JA (1985). A study of restriction fragment length polymorphisms at the human alpha-1-antitrypsin locus. *Hum Genet* 69:263-267.

McBRIDE OW, OZER HL (1973). Transfer of genetic information by purified metaphase chromosomes. *Proc Natl Acad Sci USA* 70:1258-1262.

McKUSICK VA (1983). *Mendelian inheritance in man: catalogs of autosomal dominant, autosomal recessive, and X-linked phenotypes*. 6th edition. Johns Hopkins University Press, Baltimore.

McKUSICK VA, RUDDLE FH (1977). The status of the gene map of the human chromosomes. *Science* 198:390-405.

MILLER OJ, ALLERDICE PW, MILLER DA, BREG WR, MIGEON BR (1971). Human thymidine kinase gene locus: Assignment to chromosome 17 in a hybrid of man and mouse cells. *Science* 173:244-245.

MIZUSAWA H, TAIRA M, YAGINUMA K, KOBAYASHI M, YOSHIDA E, KOIKE K (1985). Inversely repeating integrated hepatitis B virus DNA and cellular flanking sequences in the human hepatoma-derived cell line huSP. *Proc Natl Acad Sci USA* 82:208-212.

MOHANDAS T, SPARKES RS, SPARKES MC, SHULKIN JD, TOOMEY KE, FUNDERBURK SJ (1979). Regional localization of human gene loci on chromosome 9: Studies of somatic

cell hybrids containing human translocations. *Amer J Hum Genet* 31:586-600.

MONACO AP, NEVE RL, COLLETTI-FEENER C, BERTELSON CJ, KURNIT DM, KUNKEL LM (1986). Isolation of candidate cDNAs for portions of the Duchenne muscular dystrophy gene. *Nature* 323:646-650.

MORTON NE (1955). Sequential tests for the detection of linkage. *Amer J Hum Genet* 7:277-318.

MURRAY JM, DAVIES KE, HARPER PS, MEREDITH L, MUELLER CR, WILLIAMSON R (1982). Linkage relationships of a cloned DNA sequence on the short arm of the X chromosome to Duchenne muscular dystrophy. *Nature* 300:69-71.

MURRAY JC, DEMOPULOS CM, LAWN RM, MOTULSKY AG (1983). Molecular genetics of human serum albumin: restriction fragment length polymorphisms and analbuminemia. *Proc Natl Acad Sci USA* 80:5951-5955.

MURRAY JC, MILLS KA, DEMOPULOS CM, HORNUNG S, MOTULSKY AG (1984). Linkage disequilibrium and evolutionary relationships of DNA variants (RFLPs) at the serum albumin locus. *Proc Natl Acad Sci USA* 81:3486-3490.

NAKAMURA Y, JULIER C, WOLFF R, HOLM T, O'CONNELL P, LEPPERT M, WHITE R (1987a). Characterization of a human 'midisatellite' sequence. *Nucleic Acids Res* 15:2537-2547.

NAKAMURA Y, LEPPERT M, O'CONNELL P, WOLFF R, HOLM T, CULVER M, MARTIN C, FUJIMOTO E, HOFF M, KUMLIN E, WHITE R (1987b). Variable number of tandem repeat (VNTR) markers for human gene mapping. *Science* 235:1616-1622.

NAYLOR S, LALOUEL J-M, SHAW DJ (1985). Report of the committee on the genetic constitution of chromosomes 17, 18 and 19. *Cytogenet Cell Genet* 40:242-267.

NEEL JV (1984). A revised estimate of the amount of genetic variation in human proteins: implications for the distribution of DNA polymorphisms. *Amer J Hum Genet* 36:1135-1148.

NEI M (1975). *Molecular population genetics and evolution*. North Holland Publishing Company, Amsterdam.

NEI M, ROYCHOUDHURY AK (1982). Genetic relationship and evolution of human races. In: Hecht MK, Wallace B, Prance GT (Eds), *Evolutionary Biology* (vol 14), pp 1-59.

NEITZEL H (1986). A routine method for the establishment of permanent growing lymphoblastoid cell lines. *Hum Genet* 73:320-326.

NURSE GT, JENKINS T (1977). Health and the hunter-gatherer: biomedical studies on the hunting and gathering population. In: Beckman L, Hauge M (Eds), *Monographs in Human Genetics, vol 8,* S Karger, Basel.

NURSE GT, BOTHA MC, JENKINS T (1977). Sero-genetic studies on the San of South West Africa. *Hum Hered* 27:81-98.

NURSE GT, WEINER JS, JENKINS T (1985). *The peoples of Southern Africa and their affinities.* Oxford University Press, New York.

O'BRIEN SJ (1984). Genetic map of the domestic cat (*Felis cattus*). In: O'Brien SJ (Ed) *Genetic Maps* III. Cold Spring Harbor Press, New York. pp 385-387.

O'BRIEN SJ, NASH WG (1982). Genetic mapping in mammals: chromosomal map of domestic cat. *Science* 216:257-265.

O'BRIEN SJ, HASKINS ME, WINCKLER CA, NASH WG, PATTERSON DF (1986). Chromosomal mapping of beta-globin and albino loci in the domestic cat. A conserved mammalian linkage group. *J Hered* **77**:374-378.

O'CONNELL P, LEPPERT M, HOFF M, KUMLIN E, THOMAS W, CAI GY, JEROMINSKI L, LAW ML, WHITE R (1985). A linkage map for human chromosome 12. *Cytogenet Cell Genet* **40**:715 (abstract).

OETTLÉ AG (1963). Skin cancer in Africa. *National Cancer Institute Monograph* **10**:197-214.

OKORO AN (1975). Albinism in Nigeria. A clinical and social study. *Br J Dermatol* **92**:485-492.

OLAISON B, TEISBERG P, THORSBY E, SIVERTS A, JONASSEN R, WILHELMY MC (1983). Gene order and gene distances in the HLA region studied by the haplotype method. *Ann Hum Genet* **47**:285-292.

OLD JM, HIGGS DR (1983). Gene analysis. In: *Methods in Hematology. The Thalassemias*. Weatherall DJ (Ed), Butler and Tanner Ltd., Frome and London p78.

OLD RW, PRIMROSE SB (1980). *Principles of gene manipulation: an introduction to genetic engineering*. Blackwell Scientific, Oxford.

ORGEL LE, CRICK FHC (1980). Selfish DNA: the ultimate parasite. *Nature* **284**:604-607.

ORKIN SH (1986). Reverse genetics and human disease. *Cell* **47**:845-850.

ORKIN SH, GOLDMAN DS, SALLAN SE (1984). Development of homozygosity for chromosome 11p markers in Wilm's tumour. *Nature* **309**:172-174.

OTT J (1974). Estimation of the recombination fraction in human pedigrees: efficient computation of the likelihood for human linkage studies. *Amer J Hum Genet* **26**:588-597.

OTT J (1985). *Analysis of human genetic linkage*. Johns Hopkins University Press, Baltimore.

PAGNIER J, MEARS JG, DUNDA-BELKHODJA O, SCHAEFER-REGO KE, BELJORD C, NAGEL RL, LABIE D (1984). Evidence for the multicentric origin of the sickle cell hemoglobin gene in Africa. *Proc Natl Acad Sci USA* **81**:1771-1773.

PAWELEK J, KORNER A, BERGSTROM A, BOLOGNA J (1980). New regulators of melanin biosynthesis and the auto-destruction of melanoma cells. *Nature* **286**:617-619.

PEARSON K, NETTLESHIP E, USHER CH (1911-1913). *A monograph on albinism in man.* Draper's Company Research Memoirs. Biometric Ser. 6, 8, and 9 (6 parts), London.

PEARSON PL (1985). Restriction fragment length polymorphisms (RFLP's) and their use in mapping the human genome. *Prog Clin Biol Res* 177:23-36.

PONCZ M, SCHWARTZ D, BALLANTINE M, SURREY S (1983). Nucleotide sequence analysis of the δβ-globin gene region in humans. *J Biol Chem* 258:11599-11609.

PROUDFOOT NJ, GIL A, MANIATIS T (1982). The structure of the human zeta-globin gene and a closely linked, nearly identical pseudogene. *Cell* 31:553-563.

PURELLO M, ALDEHOFF B, ESPOSITO D, WHITTINGTON E, DANIEL A, BUCKTON KE, SINISCALCO M (1985). The subregional assignment of the human locus for alpha-1-antitrypsin (PI) to band 14q32.1 suggests uneven distribution of crossing over events in the distal third of autosome 14q. Eight International Workshop in Human Gene Mapping. *Cytogenet Cell Genet* 40:725.

RACE RELATIONS SURVEY (1985). Institute of Race Relations, Johannesburg.

RACE RR, SANGER R (1968). *Blood groups in man*. Fifth edition. Blackwell Scientific Publications. Oxford and Edinburgh.

REED KC, MANN DA (1985). Rapid transfer of DNA from agarose gels to nylon membranes. *Nucl Acids Res* 13:7207-7221.

REEVE AE, HOUSIAUX P, GARDNER RJM, CHEWINGS WE, GRINDLEY RM, MILLOW LJ (1984). Loss of a Harvey *ras* allele in sporadic Wilms' tumour. *Nature* 309:174-176.

RENWICK JH (1969). Progress in mapping human autosomes. *Br Med Bull* 25:65-73.

RENWICK JH (1971). The mapping of human chromosomes. *Ann Rev Genet* 5:81-120.

RIGBY PWJ, DIECKMANN M, RHODES C, BEREV P (1976). Labelling deoxyribonucleic acid to high specific activity *in vitro* by nick translation with DNA polymerase I. *J Mol biol* 113:237-251.

ROBERTS DF, KROMBERG JGR, JENKINS T (1986). Differentiation of heterozygotes in recessive albinism. *J Med Genet* 23:323-327.

RODERICK TH, DAVISSON MT (1984). Linkage map of the mouse *(Mus musculus)*. In: O'Brien SJ (Ed) *Genetic Maps* III. Cold Spring Harbor Press, New York, pp 343-355.

ROGERS JH (1985). The origin and evolution of retroposons. *Int Rev Cyt* 93:187-279.

ROBINS AH. Skin pigmentation and psychiatric illness. PhD Thesis 1970.

RUDDLE FH (1972). Linkage analysis using somatic cell hybrids. *Adv Hum Genet* 3:173-235.

RUDDLE FH (1981). A new era in mammalian gene mapping: Somatic cell genetics and recombinant DNA methodologies. *Nature* 294:115-120.

SALSER W (1977). Globin mRNA sequences: Analysis of base pairing and evolutionary implications. *Cold Spring Harbor Symp Quant Biol* 42:985-1002.

SANDBERG K, ANDERSSON L (1987). Linkage of albino and hemoglobin beta-chain loci in the rabbit. *J Hered* 78:124-125.

SCHMID CW, DEININGER PL (1975). Sequence organization of the human genome. *Cell* 6:345-358.

SCHWARTZ DC, CANTOR CR (1984). Separation of yeast chromo[illegible]-sized DNAs by pulsed field gel electrophoresis. *Cell* 37:67-75.

SHAFIT-ZAGARDO [illegible] MAIO JJ, BROWN FL (1982). KpnI families o[illegible]ng, interspersed repetitive DNAs in human and other primates. *Nucleic Acids Res* 10:3175-3193.

SHERMAN SL, BALL SP, ROBSON EB (1985). A genetic map of chromosome 19 based on 2-point lod tables. *Cytogenet Cell Genet* 40:742A.

SHIMIZU Y, YOSHIDA K, REN C-S, FUJINAGA K, RAJAGOPALAN S, CHINNADURAI G (1983). *Hinf* family: a novel repeated DNA family of the human genome. *Nature* 302:587-590.

SIDMAN RL, PEARLSTEIN R (1965). Pink-eyed dilution (*p*) gene in rodents: increased pigmentation in tissue culture. *Dev Biol* 12:93-116.

SILVERS WK (1979). *The coat colors of mice. A model for mammalian gene action and interaction.* Springer-Verlag, New York.

SINGER MF, SKOWRONSKI J (1985). Making sense out of LINES: long interspersed repeat sequences in mammalian genomes. *Trends Biochem* 10:119-122.

SINGER MF, THAYER RE, GRIMALDI G, LERMAN MI, FANNING TG (1983). Homology between the *KpnI* primate and *BamHI* (M1F-1) rodent families of long interspersed repeated sequences. *Nucleic Acids Res* 11:5739-5745.

SINGER R, WEINER JS (1953). Biological aspects of some indigenous African populations. *South-Western J Anthropol* 9:168-176.

SKOLNICK MH, WHITE R (1982). Strategies for detecting and characterizing restriction fragment length polymorphisms (RFLP's). *Cytogenetic Cell Genet* 32:58-67.

SKOWRONSKI J, SINGER MF (1985). Expression of a cytoplasmic LINE-1 transcript is regulated in a human teratocarcinoma cell line. *Proc Natl Acad Sci USA* 82:6050-6054.

SKRE H, BERG K (1974). Cerebellar ataxia and total albinism: a kindred suggesting pleiotropism or linkage. *Clin Genet* 5:196-204.

SMITH CL, CANTOR CR (1986a). Approaches to physical mapping of the human genome. *Cold Spring Harbor Symp Quant Biol* 51:115-122.

SMITH CL, CANTOR CR (1986b). Pulsed-field gel electrophoresis of large molecules. *Nature* 319:701-701.

SORSBY A (1958). Noah-an albino. *Br Med J* 2:1587-1589.

SOUTHERN EM (1975). Detection of specific sequences among DNA fragments separated by gel electrophoresis. *J Mol Biol* 98:503-517.

STEFFENSON DM, WIMBER DE (1971). Localization of tRNA genes in the salivary chromosomes of *Drosophila* by RNA:DNA hybridization. *Genetics* 69:163-178.

STEINBERG AG, BLEIBTREU HK, KURCZYNSKI TW, MARTIN AE, KURCZYNSKI EM (1967). Genetic studies on an inbred human isolate. In Crow JF, Neel JV (Eds), *Proceedings of the 3rd International Congress of Human Genetics*, Johns Hopkins Press, Baltimore, pp267-289.

STEINMETZ M, MINARD K, HORVATH S, McNICHOLAS J, SRELINGER J, WAKE C, LONG E, MACH B, HOOD L (1982). A molecular map of the immune response region from the

major histocompatibility complex of the mouse. *Nature* 300:35-42.

STERN C (1970). Model estimates of the number of gene pairs involved in pigmentation variability of the Negro-American. *Hum Hered* 20:165-168.

STOLC V, GILL TJ (1983). Linkage and polymorphism of a gene controlling lactate dehydrogenase in the rat. *Biochem Genet* 21:933-941.

SYKES BG (1983). DNA in heritable disease. *Lancet* ii:787-788 (letter).

TASHIMA M, CALABRETTA B, TORELLI G, SCOFIELD M, MAIZEL A, SAUNDERS G (1981). Presence of a highly repetitive and widely dispersed DNA sequence in the human genome. *Proc Natl Acad Sci USA* 78:1508-1512.

TAUTZ D, TRICK M, DOVER GA (1986). Cryptic simplicity in DNA is a major source of genetic variation. *Nature* 322:652-656.

TEISBERG P (1970). High voltage agarose gel electrophoresis in the study of C3 polymorphism. *Vox Sang* 19:47-56.

TOBIAS PV (1971). The biological invalidity of the term Bantu. *S Afr J Sci* 67:517-520.

TREVOR-ROPER PD (1952). Marriage of two complete albinos with normally pigmented offspring. *Br J Ophthalmol* 36:107-108.

VAN DER BERG J, VAN OOYEN A, MANTEI N, SCHAMBOCK A, GROSVELD G, FLAVELL RA, WEISSMANN C (1978). Comparison of cloned rabbit and mouse β-globin genes showing strong evolutionary divergence of two homologous pairs of introns. *Nature* 276:37-44.

VAN DER PLOEG LHT, FLAVELL RA (1980). DNA methylation in the human γδβ-globin locus in erythroid and non-erythroid tissues. *Cell* 19:947-958.

VAN DORP DB (1987). Albinism, or the NOACH syndrome (The book of Enoch c.v. 1-20). *Clin Genet* 31:228-242.

VAN DORP DB, VAN HAERINGEN NJ, DELLEMAN JW, APKARIAN P, WESTERHOF W (1983). Albinism: phenotype or genotype? *Doc Ophthalmol* 56:183-194.

VASSART G, GEORGES M, MONSIEUR R, BROCAS H, LEQUARRE AS, CRISTOPHE D (1987). A sequence in M13 phage detects hypervariable minisatellites in human and animal DNA. *Science* 235:683-684.

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